California Regional Water Quality Control Board
Santa Ana Region

RESOLUTION NO. R8-2009-0034

Resolution Approving the Workplan Submitted by the Yucaipa Valley Water District to Install Monitoring Wells in the San Timoteo Groundwater Management Zone to Collect Data Necessary to Determine the Ambient TDS and Nitrogen Quality as Required in the Total Dissolved Solids and Nitrogen Management Plan Specified in the Water Quality Control Plan for the Santa Ana River Basin

WHEREAS, the California Regional Water Quality Control Board, Santa Ana Region (hereinafter Regional Board), finds that:

1. An updated Water Quality Control Plan for the Santa Ana River Basin (Basin Plan) was adopted by the Regional Board on March 11, 1994, approved by the State Water Resources Control Board (SWRCB) on July 21, 1994, and approved by the Office of Administrative Law (OAL) on January 24, 1995.

2. Amendments to the Basin Plan to incorporate a revised Total Dissolved Solids and Nitrogen Management Plan into the 1995 Basin Plan were approved by the Regional Board on January 22, 2004, by the State Water Resources Control Board on October 1, 2004 and by the Office of Administrative Law on December 23, 2004. The surface water standards components of the amendments were approved by the U. S. Environmental Protection Agency (EPA) on June 20, 2007.

3. The revised Total Dissolved Solids and Nitrogen Management Plan addresses total dissolved solids (TDS) and nitrogen in both surface waters and groundwaters throughout the Santa Ana River basin.

4. The revised TDS and Nitrogen Management Plan includes a Maximum Benefit Implementation Plan for Salt Management in the San Timoteo and Yucaipa Management Zones (hereinafter, Maximum Benefit Implementation Plan). The Maximum Benefit Implementation Plan identifies the actions necessary to implement maximum benefit water quality objectives for TDS and nitrate-nitrogen that apply to the San Timoteo and Yucaipa Management Zones. These objectives apply provided that the Yucaipa Valley Water District (hereinafter, YVWD) implements specific plans and projects, including the periodic determination of ambient groundwater quality.

5. Pursuant to the Maximum Benefit Implementation Plan, Section B.6, YVWD was required to submit by July 1, 2005, and every three years thereafter, a determination of ambient TDS and nitrate-nitrogen quality in the San Timoteo and Yucaipa Management zones. YVWD has joined the Basin Monitoring Program (BMP) Task Force to accomplish this requirement. The BMP Task Force has conducted the computation for most management zones including Yucaipa Management Zone. However, the ambient TDS and nitrate-nitrogen quality for San Timoteo Management Zone has not been determined due to lack of data.

6. YVWD proposed the "San Timoteo Management Zone Monitoring Network Development Workplan" (October 31, 2008) (Workplan) to install three monitoring wells in the San

Timoteo Management Zone. These monitoring wells, together with the existing wells, will provide sufficient data for computation of ambient TDS and nitrogen quality for San Timoteo MZ during the calculation period of 1993 to 2012.

7. The Workplan must be implemented by YVWD. The Maximum Benefit Implementation Plan requires that this and other projects and programs be implemented prior to the recharge of recycled water in either the San Timoteo Management Zone or the Yucaipa Management Zone. This requirement has been incorporated in water recycling requirements issued to YVWD.

NOW, THEREFORE, BE IT RESOLVED THAT:

The Regional Board approves the attached proposed Workplan for installation of monitoring wells submitted by the YVWD on October 31, 2008.

I, Gerard J. Thibeault, Executive Officer, do hereby certify that the foregoing is a full, true and correct copy of a resolution adopted by the California Regional Water Quality Control Board, Santa Ana Region, on April 24, 2009.

Gerard J. Thibeault
Executive Officer

Yucaipa Valley Water District

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October 31, 2008

Mr. Gerard Thibeault
Regional Water Quality Control Board, Santa Ana Region
3737 Main Street, Suite 500
Riverside, California 92501-3348

Subject: Response to the "Maximum Benefit Commitment Status" dated August 13, 2008

Dear Mr. Thibeault,

This letter is in response to correspondence dated August 13, 2008 from the California Regional Water Quality Control Board, Santa Ana Region requesting information about the maximum benefit commitment status of the Yucaipa Valley Water District. This correspondence identifies the following two tasks that need to be addressed to maintain our maximum benefit program: 1) Ambient Groundwater Quality Determination; and 2) Remove/Reduce the Discharge of YVWD Effluent from the Unlined Portion of San Timoteo Creek. The following information has been prepared to demonstrate the District's firm commitment to adhere to the objectives of the YVWD maximum benefit program.

Ambient Groundwater Quality Determination

The Yucaipa Valley Water District recognizes the importance of calculating the ambient groundwater quality for the Yucaipa and San Timoteo Management Zones. Your correspondence dated August 13, 2008 states:

> "In order to continue to operate under the maximum benefit program, including waste discharge limitations based on the maximum benefit objectives, YVWD is hereby required to develop a workplan and schedule for the installation of monitoring wells in the San Timoteo Management Zone that will provide adequate data for calculation of the ambient groundwater quality."

The District has contracted with Wildermuth Environmental to prepare a workplan and schedule for the installation of monitoring wells in the San Timoteo Management Zone. The attached *San Timoteo Management Zone Monitoring Network Development Workplan* provides the details for locating wells to provide adequate data for calculation of the ambient groundwater quality. Upon acceptance of the workplan by the Regional Board, the District is prepared to work in cooperation with the City of Beaumont and the San Timoteo Watershed Management Authority to implement the groundwater monitoring program.

Since the monitoring required for the District overlaps with other efforts in the San Timoteo Management Zone, the District will coordinate with the San Timoteo Watershed Management Authority and the City of Beaumont to provide the Regional Board with an annual report that reflects the combined data collected from the groundwater monitoring program. This report is expected to be provided to the Regional Board with a transmittal letter from the Yucaipa Valley Water District to make certain we maintain full compliance with our specific maximum benefit program.

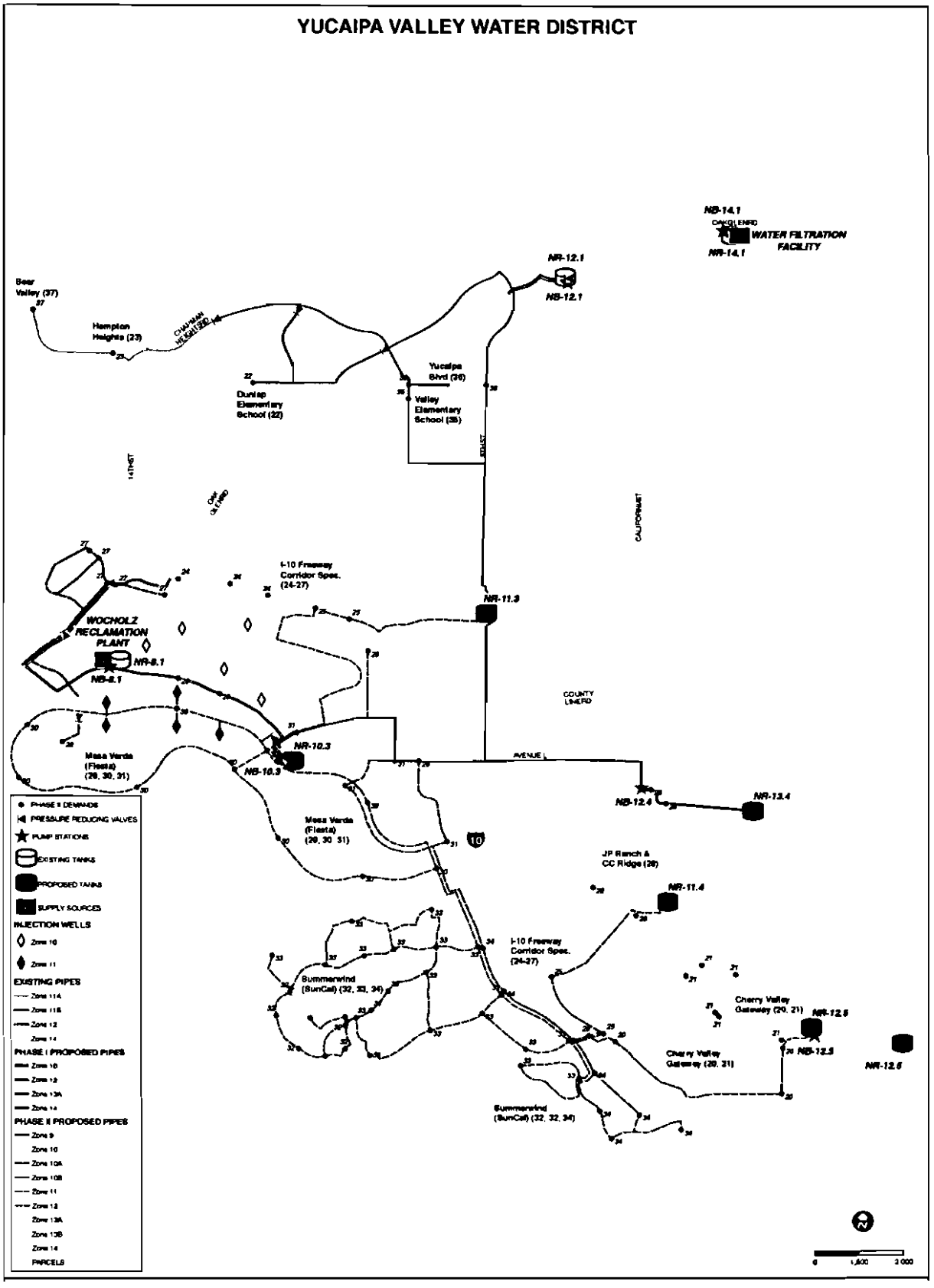
Remove/Reduce the Discharge of YVWD Effluent from San Timoteo Creek

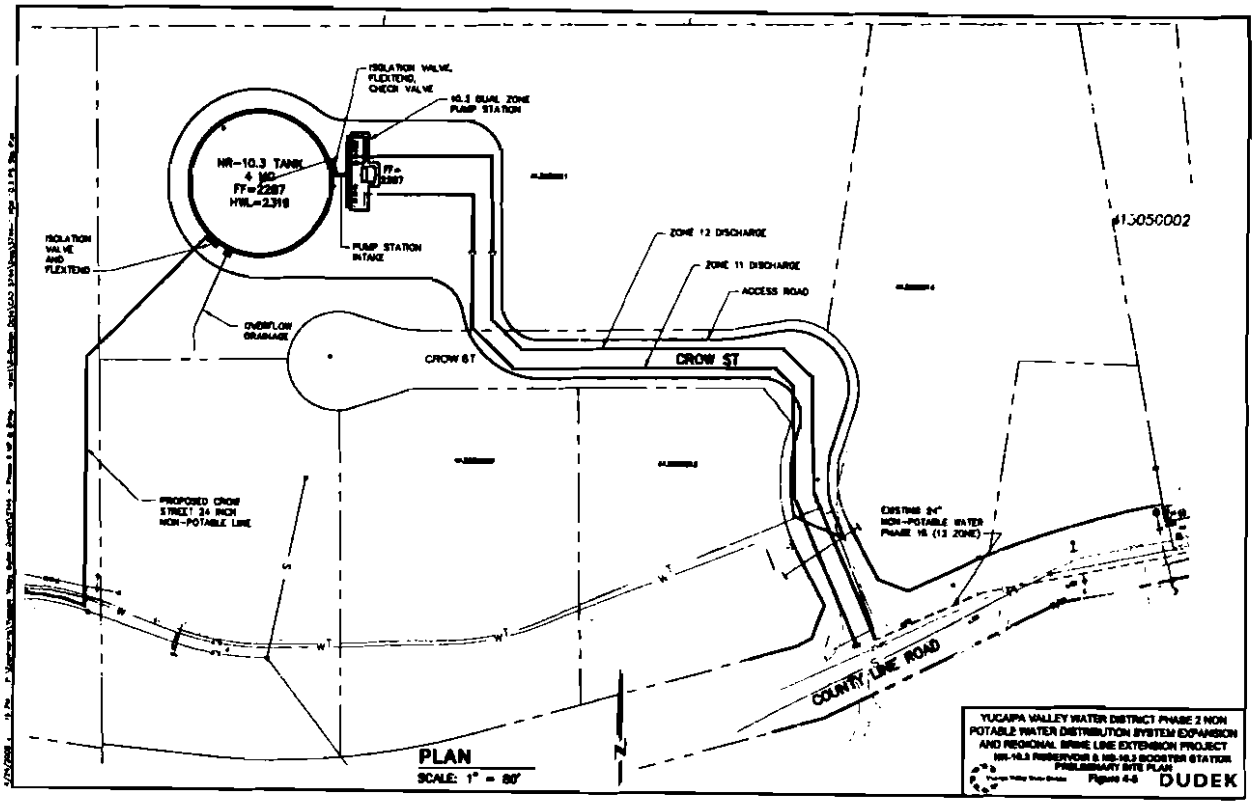
The Yucaipa Valley Water District has aggressively pursued the construction of non-potable water infrastructure necessary to reduce the flow of water from San Timoteo Creek. At this time, the District needs to construct approximately 5,000 linear feet of 24-inch non-potable water transmission (Phase II Non-Potable Water Distribution System Expansion); a water storage reservoir (Non-Potable Reservoir NR-10.3); and a non-potable water booster station to pump recycled water from Reservoir 10.3 to Pressure Zones 11 and 12 (Booster Station NB-10.3).

The following schedule is provided as a timeline for the completion of these facilities

August 2007	YVWD enters into a preliminary design contract for the Phase II Non-Potable Water Distribution System Expansion
April 2008	Preliminary Design Report for the Phase II Non-Potable Water Distribution System Expansion completed
May 2008	YVWD enters into a final design contract for the Phase II Non-Potable Water Distribution System Expansion
August 2008	YVWD completed construction of a 4 million gallon recycled water storage reservoir (NR-8.1) and booster station (NB-8.1) at the Wochholz Regional Water Recycling Facility
October 2008	YVWD completes and files a State Revolving Fund Loan application for the construction of the recycled water pipeline, reservoir and booster station.
May 2009	YVWD to begin construction of the Phase II Non-Potable Water Distribution System Expansion
October 2009	YVWD to complete design of Non-Potable Reservoir NR-10.3 and Booster Station NB-10.3
July 2011	YVWD to complete construction of Non-Potable Reservoir NR-10.3
January 2012	YVWD to complete construction of Booster Station NB-10.3

The following illustrations provide information on the recycled water facilities completed to date and the proposed facilities discussed above.


YUCAIPA VALLEY WATER DISTRICT
NR-14.1
OAKGLENRD
WATER FILTRATION FACILITY
NR-14.1
NR-12.1
NR-12.1
Bear Valley (37)
Hampton Heights (23)
CHAPMAN HEIGHTS RD
Dunlap Elementary School (22)
Yucaipa Blvd (26)
Valley Elementary School (35)
14TH ST
OAK GLEN
I-10 Freeway Corridor Spec. (24-27)
NR-11.3
WOCHOLZ RECLAMATION PLANT
NR-8.1
NR-8.1
COUNTY LINE RD
Mesa Verde (Fiesta) (29, 30, 31)
NR-10.3
NR-10.3
AVENUE L
NR-12.4
NR-13.4
Mesa Verde (Fiesta) (29, 30, 31)
JP Ranch & CC Ridge (28)
NR-11.4
I-10 Freeway Corridor Spec. (24-27)
Summerwind (SunCal) (32, 33, 34)
Cherry Valley Gateway (20, 21)
NR-12.5
NR-12.5
NR-12.6
Cherry Valley Gateway (20, 21)
Summerwind (SunCal) (32, 33, 34)
PHASE II DEMANDS
PRESSURE REDUCING VALVES
PUMP STATIONS
EXISTING TANKS
PROPOSED TANKS
SUPPLY SOURCES
INJECTION WELLS
Zone 10
Zone 11
EXISTING PIPES
Zone 11A
Zone 11B
Zone 12
Zone 14
PHASE I PROPOSED PIPES
Zone 10
Zone 12
Zone 13A
Zone 14
PHASE II PROPOSED PIPES
Zone 9
Zone 10
Zone 10A
Zone 10B
Zone 11
Zone 12
Zone 13A
Zone 13B
Zone 14
PARCELS
0
1,500
3,000



The District has completed the environmental documentation necessary to implement an adaptive management plan for the removal of recycled water in San Timoteo Creek. The District currently anticipates a minimum flow of 1.6 MGD of water being contributed to San Timoteo Creek.

Additional Water Quality Enhancements

The District recognizes that our maximum benefit program requires a firm commitment of capital and labor resources to protect water quality in the region. I can assure you that the Board and staff of the Yucaipa Valley Water District recognize the significance of the maximum benefit program and have therefore taken a series of proactive steps beyond the regulatory requirements contained within the maximum benefit program to protect and enhance water quality within the Yucaipa, San Timoteo and Beaumont Management Zones. As a result of these programs, the District anticipates developing enhanced water quality and water quantity to provide a sustainable water supply for future generations which is likely to result in the creation of assimilative capacity assigned to the Yucaipa Valley Water District.

Specifically, the programs currently implemented by the Yucaipa Valley Water District include:

1. **Communication of the Maximum Benefit Program**. The District believes that to effectively implement our maximum benefit program, the program must be explained to our ratepayers and developers who will share in the responsibility for financing the program. Therefore, the District prepared Section 5 of the *Strategic Plan for a*

Sustainable Future: The Integration and Preservation of Resources to clearly explain the importance of watershed management and specifically disclose the requirements of the maximum benefit program.

A copy of the *Strategic Plan for a Sustainable Future: The Integration and Preservation of Resources* is attached for your review.

2. **Pollution Prevention**. The District recognizes that septic systems do not improve the groundwater quality in our region. In order to provide a sustainable water supply for future generations, the Board of Directors took steps in Resolution 11-2008 to require the following:

    - Requirement to Connect to the Sewer System. In order to protect the Yucaipa and Beaumont Groundwater Management Zones, the District shall require new developments consisting of five or more Equivalent Dwelling Units within 1,000 feet of any existing or previously agreed upon sewage collection facility must extend the public sewer line to serve said development.

    - Dry Sewer Collection System. In order to protect the groundwater quality as required by the Basin Plan adopted by the Santa Ana Regional Water Quality Control Board, the District shall require new developments to install dry sewer collection systems if existing active sewer collection facilities are not available.

        - Construction of One to Four Units or Development on Five Acres or More. Developments consisting of one to four Equivalent Dwelling Units or a development on more than five acres (average gross) per lot shall not be required to install dry sewers or connect to the sewer collection system unless any portion of the property being developed is within 500 feet from the sewer system which could serve the parcel.

        - Installation of Dry Sewer Collection Infrastructure. The installation of a dry sewer collection system shall extend the full length of the property to the property boundary generally upstream of the parcel/development. The dry sewer collection system shall also be extended downstream offsite of the subject property a distance of 100 feet per Equivalent Dwelling Unit (EDU) after the first EDU. For example, a development of five EDUs shall extend the dry sewer collection system 400 feet downstream toward the existing sewer collection system.

    - Sewer Septic System Offset Program. Any new development not connected to an active sewer collection system shall be required to participate in a Sewer Septic System Offset Program to mitigate the pollution created by the addition of a new septic system. This Program requires the conversion/connection of existing septic systems to the sewer in the service area of the Yucaipa Valley Water District. Participation in this program does not relieve the property owner from future participation in the construction of sewer infrastructure when available or paying current fees for the property receiving the septic system offset.

While some of the requirements adopted by the District may be more stringent than those requirements of the Regional Water Quality Control Board, I would respectfully request your support and the support of your staff to assist the District in implementing these requirements.

A copy of YVWD Resolution No. 11-2008 is attached for your review.

3. **Groundwater Management Plan**. The District has convened routine meetings of the major water producers in the area which include: the City of Redlands; Western Heights Mutual Water Company; South Mesa Mutual Water Company; and Yucaipa Valley Water District. The purpose of our meetings is to develop a groundwater management plan for the extraction and recharge of water in the Yucaipa Management Zone to protect the groundwater quantity and quality. The group anticipates developing a groundwater management plan within the next year.

4. **H.R. 2614**. H.R. 2614 represents the District's most recent effort to seek federal assistance for the construction of the Yucaipa Valley Regional Brineline. This legislation was introduced on June 7, 2007 and passed in the House of Representatives on November 13, 2007. On September 16, 2008, the bill was placed on the Senate Legislative Calendar under General Orders (Calendar No. 1019).

   A copy of HR 2614 is attached for your review.

5. **Yucaipa Valley Regional Brineline Project**. The District recognizes that in order to maximize the use of recycled water in the Yucaipa, Beaumont and San Timoteo Management Zones, a brineline must be constructed to extend the existing Santa Ana Regional Interceptor (SARI) pipeline from San Bernardino to Yucaipa. On October 15, 2008, the Board authorized the final design of the Yucaipa Valley Brineline. The design of this facility is scheduled to be completed by December 2009. Based on the authorization to proceed to construction, the District expects to complete the brineline pipeline by December 2012.

   On September 30, 2008, the District received notice that the City of Beaumont and the San Timoteo Watershed Management Authority would not be participating in the design and construction of this facility. Therefore, the District only anticipates in providing brineline capacity to Southern California Edison for the Mountain View Power Plant in the lower reaches of the Yucaipa Valley Regional Brineline.

6. **Microfiltration Facility Construction at the WWTP**. The District is concluding the enhancement and expansion of the Wochholz Regional Water Recycling Facility. The improvements at this facility will provide microfiltration facility treatment which will be used as the influent source to a future reverse osmosis facility. The District is preparing to enter into a contract with Separation Processes to develop and implement a reverse osmosis membrane selection project to determine the best RO membranes to be used for removing salinity from the recycled water produced at this facility.

On behalf of the Yucaipa Valley Water District, I appreciate your correspondence dated August 13, 2008 alerting me to the fact that our maximum benefit program may be in jeopardy. The District recognizes the importance of the maximum benefit program and will be assigning Mr.

Matt Harward and Ms. Kristen Wardlaw to this program to ensure information is provided to the Regional Water Quality Control Board to demonstrate our firm commitment to improving the water quality within the Yucaipa, San Timoteo and Beaumont Management Zones.

Should you have any questions, please contact me directly at (909) 797-5119.

Sincerely,

Joseph B. Zoba
General Manager

Attachments:

- NPDES No. CA0105619 Attachment J - Yucaipa Valley Water District Maximum Benefit Commitments (Table 5-9a of Resolution No. R8-2004-0001)
- Correspondence from the California Regional Water Quality Control Board, Santa Ana Region dated August 13, 2008 regarding the YVWD maximum benefit commitment status
- San Timoteo Management Zone Monitoring Network Development Workplan, Wildermuth Environmental, October 2008
- *A Strategic Plan for a Sustainable Future: The Integration and Preservation of Resources*, Yucaipa Valley Water District, August 2008
- YVWD Resolution No. 11-2008 - A Resolution of the Board of Directors of the Yucaipa Valley Water District Adopting a Long-Term Water Resource Sustainability Strategy Policy for the Area Served by the Yucaipa Valley Water District
- H.R. 2614 An Act to amend the Reclamation Wastewater and Groundwater Study and Facilities Act to authorize the Secretary of the Interior to participate in certain water projects in California.

ATTACHMENT J – YUCAIPA VALLEY WATER DISTRICT MAXIMUM BENEFIT COMMITMENTS

Table 5-9a of Resolution No. R8-2004-0001

Description of Commitment	Compliance Date – as soon as possible, but no later than
1. Surface Water Monitoring Program	
a. Submit Draft Monitoring Program to Regional Board	a. January 23, 2005
b. Implement Monitoring Program	b. Within 30 days from Regional Board approval of monitoring plan
c. Quarterly data report submittal	c. April 15, July 15, October 15, January 15
d Annual data report submittal	d February 15th
2. Groundwater Monitoring Program	
a Submit Draft Monitoring Program to Regional Board	a January 23, 2005
b Implement Monitoring Program	b. Within 30 days from Regional Board approval of monitoring plan
c. Annual data report submittal	c. February 15th
3. Desalter(s) and Brine Disposal Facilities	
a. Submit plan and schedule for construction of desalter(s) and brine disposal facilities. Facilities are to operational as soon as possible but no later than 7 years from date of Regional Board approval of plan/schedule.	a Within 6 months of either of the following: i When YVWD's effluent 5-year running average TDS exceeds 530 mg/L; and/or ii.. When volume weighted average concentration in the Yucaipa MZ of TDS exceeds 360 mg/L
b. Implement the plan and schedule	b Within 30 days from Regional Board approval of plan
4. Non-potable water supply Implement non-potable water supply system to serve water for irrigation purposes. The non-potable supply shall comply with a 10-year running average TDS concentration of 370 mg/L or less	December 23, 2014
5. Recycled water recharge The recharge of recycled water in the Yucaipa or San Timoteo Management Zones shall be limited to the amount that can be blended with other recharge sources to achieve a 5-year running average equal to or less than the "maximum benefit" objectives for TDS and nitrate-nitrogen for the relevant	Compliance must be achieved by end of 5th year after initiation of recycled water use/recharge operations

Description of Commitment	Compliance Date – as soon as possible, but no later than
Management Zone(s) a. Submit baseline report of amount, locations, and TDS and nitrogen quality of stormwater/imported water recharge. b. Submit documentation of amount, TDS and nitrogen quality of all sources of recharge and recharge locations. For stormwater recharge used for blending, submit documentation that the recharge is the result of YVWD enhanced recharge facilities/programs	 a. Prior to initiation of construction of basins/other facilities to support enhanced stormwater/imported water recharge. b Annually, by January 15th, after initiation construction of facilities/implementation of programs to support enhanced recharge.
6. Ambient groundwater quality determination	July 1, 2005 and every 3 years thereafter
7. Replace denitrification facilities (necessary to comply with TIN wasteload allocation specified in Table 5-5)	New facilities shall be operational no later than December 23, 2007
8. YVWD recycled water quality improvement plan and schedule a. Submit plan and schedule b. Implement plan and schedule	 a. 60 days after the TDS 12-month running average effluent quality equals or exceeds 530 mg/L for 3 consecutive months and/or the 12-month running average TIN concentration equals or exceeds 6 mg/L in any month (once replacement denitrification facilities are in place) b Upon approval by Regional Board
9. Remove/reduce the discharge of YVWD effluent from the unlined portion of San Timoteo Creek a. Submit proposed plan/schedule b. Implement plan/schedule	 a. June 23, 2005 b. Upon Regional Board approval
10. Construct the Western Regional Interceptor for Dunlap Acres a. Submit proposed construction plan and schedule. The schedule shall assure the completion of construction as soon as possible but no later than January 1, 2010. b. Implement plan and schedule	 a. June 23, 2005 b. Upon Regional Board approval

California Regional Water Quality Control Board
Santa Ana Region

Linda S. Adams
Secretary for
Environmental Protection

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Arnold Schwarzenegger
Governor

August 13, 2008

Mr. Joe Zoba, General Manager
Yucaipa Valley Water District
12770 Second Street
Yucaipa, CA 92399

MAXIMUM BENEFIT COMMITMENT STATUS

Dear Mr. Zoba:

On January 15, 2008, I wrote to you to inquire about Yucaipa Valley Water District's (YVWD) progress toward meeting the maximum benefit commitments specified for YVWD in the Basin Plan. On February 12, 2008, you responded to my inquiry with a letter, which provided an update on the status of implementation of YVWD's commitments. In addition, by a letter dated April 15, 2008 your consultant, Wildermuth Environmental, Inc. (WEI), submitted the 2007 Annual Report for the Maximum Benefit Monitoring Program. My staff have reviewed both of these submittals and have determined that YVWD has met most of the maximum benefit commitments. However, as discussed below, YVMD has not satisfactorily completed the following two tasks: 1) Ambient Groundwater Quality Determination, and 2) Remove/Reduce the Discharge of YVWD Effluent from the Unlined Portion of San Timoteo Creek. This places YVWD's maximum benefit program in jeopardy. As you know, the failure to implement maximum benefit commitments will result in significant water quality and regulatory consequences, so it is imperative that these commitments be addressed immediately. Specifically, YVWD must take action to address the following:

1) Beginning in 2005 and every three years thereafter, YVWD is required to recalculate the ambient groundwater quality for the Yucaipa, and San Timoteo groundwater Management Zones[1]. The recalculation was conducted by WEI for Yucaipa Management Zone in 2005 and in 2008. However, the re-calculation was not performed for the San Timoteo Management Zone in both years due to insufficient data. This issue was raised in prior discussions with you and at N-TDS/Basin Monitoring Task Force meetings. A review of the above–referenced 2007 Annual Report and the recalculation reports confirms that water quality data, and monitoring

[1] In addition to YVWD, responsibility for recalculation of ambient groundwater quality for the San Timoteo Management Zone also rests with the San Timoteo Watershed Management Authority and the City of Beaumont pursuant to their maximum benefit implementation program.

wells necessary to provide these data, are inadequate in the San Timoteo Management Zone.

In order to continue to operate under the maximum benefit program, including waste discharge limitations based on the maximum benefit objectives, YVWD is hereby required to develop a workplan and schedule for the installation of monitoring wells in the San Timoteo Management Zone that will provide adequate data for calculation of the ambient groundwater water quality. This workplan and schedule must be submitted to the Regional Board Executive Officer for approval by October 31, 2008 and is to be implemented upon his approval. Regional Board staff will evaluate the proposed workplan to ensure that proposed monitoring well locations are adequately spaced within the San Timoteo Management Zone. Our expectation is that the proposed schedule for this effort will result in completion of the well installation program as soon as possible. In short, the proposed workplan and schedule must be well justified.

2) YVWD's maximum benefit implementation plan specifies that by June 23, 2005, YVWD is to develop a plan and schedule to remove/reduce the discharge of effluent to the unlined portion of San Timoteo Creek. To date, we have not received a plan and schedule from YVWD. Your February 12, 2008 letter indicates that YVWD is working with the resource agencies to complete the environmental documentation and that YVWD has previously submitted an "...adaptive management plan [proposal]..." to the Regional Board in 1996 and 2001. However, these documents do not constitute the required plan and schedule for reduction/removal of effluent from San Timoteo Creek.

   While we understand that negotiations are continuing and appreciate the difficulty that may be encountered in securing compliance with the California Environmental Quality Act and the National Environmental Policy Act (NEPA), we believe that specific plans and schedules can be developed taking these and other considerations into account. A critical path and schedule can be identified, along with alternative scenarios that will be implemented if necessitated by circumstances, such as the inability to achieve CEQA/NEPA compliance. Again, this plan and schedule is long overdue. Therefore, a proposed plan and schedule must be submitted to the Regional Board Executive Officer for review and approval as soon as possible, but no later than October 31, 2008.

Finally, since most of the monitoring required of YVWD overlaps with that being conducted by San Timoteo Watershed Management Authority/City of Beaumont as part of their maximum benefit program, we request that the annual report prepared and submitted on behalf of YVWD by your consultant be combined with the report for San Timoteo Watershed Management Authority/City of Beaumont. We believe it is more appropriate and useful to present and summarize the data for each management zone, rather than for each agency.

A similar issue with respect to implementation of maximum benefit commitments exists for Chino Basin Watermaster (Watermaster)/Inland Empire Utilities Agency (IEUA). To address the Watermaster/IEUA issues, I have scheduled an item at the September 5, 2008 Regional Board meeting for the Watermaster/IEUA to provide information to the Board on the status of their maximum benefit commitments. I may also schedule a similar presentation at a future Regional Board meeting to review the status of YVWD's maximum benefit status, including the option of scheduling a hearing to consider whether the application of the maximum benefit objectives continues to be appropriate.

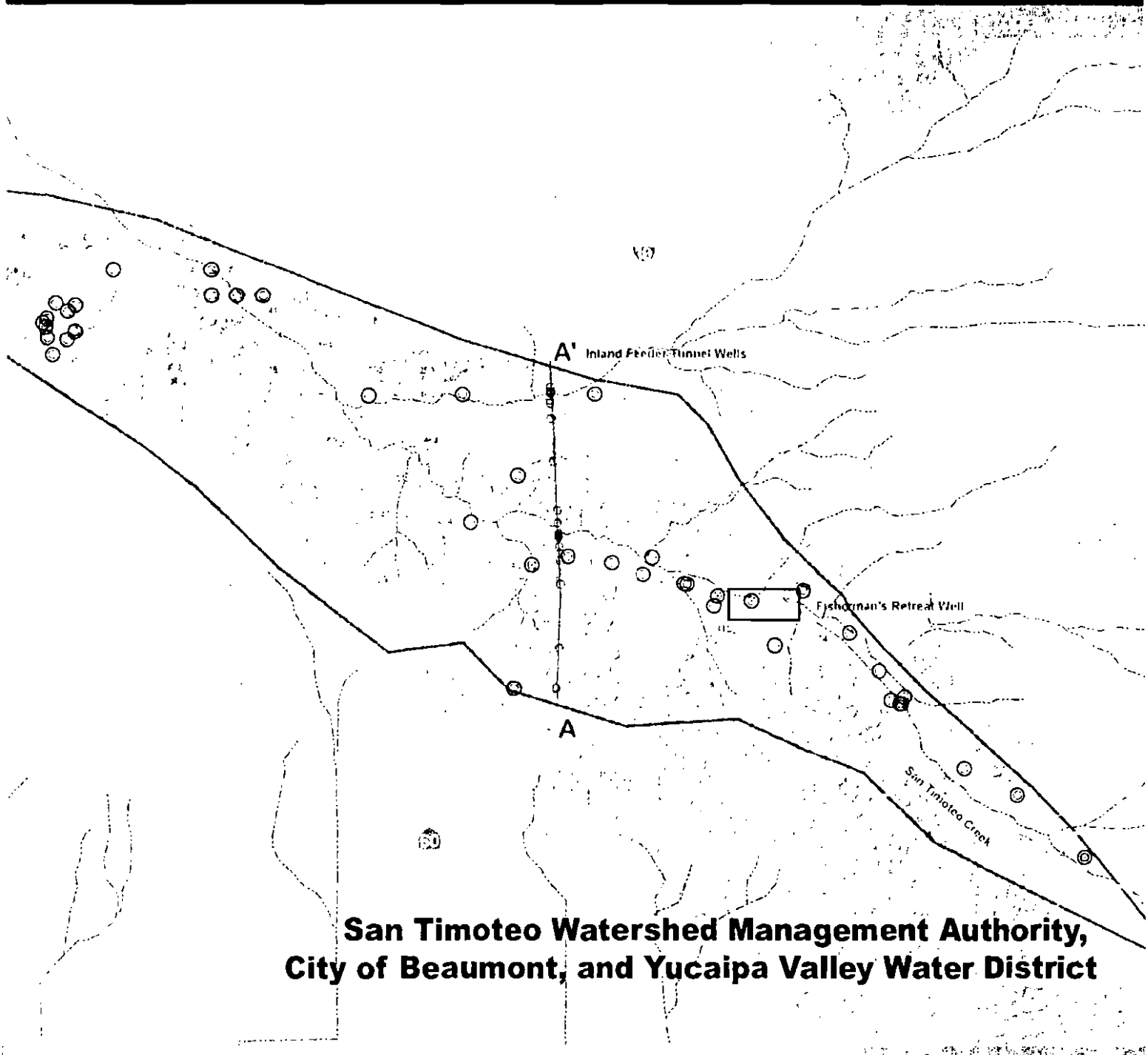
If you have any questions about these comments or the maximum benefit requirements, please feel free to contact me at (951)782-3284. You may also contact Hope Smythe at (951)782-4493 (hsmythe@waterboards.ca.gov), or Cindy Li at (951)782-4906 (cli@waterboards.ca.gov).

Sincerely,

Gerard J. Thibeault
Executive Officer

cc:
Mark Wildermuth, Wildermuth Environmental, Inc., mwildermuth@wildermuthenvironmental.com
Mark Norton, Santa Ana Watershed Project Authority, mnorton@sawpa.org
J. Andrew Schlange, San Timoteo Watershed Management Agency, jasa921@aol.com
Deepak Moorjani, City of Beaumont, dmoorjani@ci.beaumont.ca.us

San Timoteo Management Zone Monitoring Network Development Workplan



San Timoteo Watershed Management Authority, City of Beaumont, and Yucaipa Valley Water District

WILDERMUTH™ ENVIRONMENTAL INC.

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Acronyms, Abbreviations, and Initialisms

Amendment	Basin Plan Amendment
Basin Plan	Water Quality Control Plan
bgs	below ground surface
CEQA	California Environmental Quality Act
City	The City of Beaumont
DWR	California Department of Water Resources
GWMP	Groundwater Monitoring Program
mg/L	milligrams per liter
MWD	Metropolitan Water District of Southern California
Regional Board	Santa Ana Regional Water Quality Control Board
STMZ	San Timoteo Management Zone
STWMA	San Timoteo Watershed Management Authority
TDS	total dissolved solids
WEI	Wildermuth Environmental, Inc.
YVWD	Yucaipa Valley Water District

Section 1 – Introduction

1.1 Background

In January 2004, the Santa Ana Regional Water Quality Control Board (Regional Board) amended the Water Quality Control Plan (Basin Plan) for the Santa Ana River Basin to incorporate an updated total dissolved solids (TDS) and nitrogen management plan (RWQCB, 2004). The Basin Plan Amendment (Amendment) included revised groundwater management zones, revised TDS and nitrate-nitrogen water quality objectives for groundwater, revised TDS and nitrogen wasteload allocations, revised reach designations, and revised TDS and nitrogen objectives and beneficial uses for specific surface waters. The technical work supporting the Amendment was directed by the Nitrogen/TDS Task Force (Task Force) and is summarized in *TIN/TDS Study (Phase 2A) of the Santa Ana Watershed, Final Technical Memorandum* (WEI, 2000).

In addition to the updated antidegradation water quality objectives set forth by the Amendment, alternative maximum benefit objectives were specified for certain groundwater management zones, including the Beaumont, San Timoteo, and Yucaipa Management Zones (Table 1-1). These "maximum benefit" objectives, which provide assimilative capacity for TDS and nitrate-nitrogen, are based on demonstrations that beneficial uses will continue to be protected and that water quality consistent with the maximum benefit to the people of the State of California will be maintained.

As stated in the Amendment, the maximum benefit objectives for said management zones are contingent upon commitments made by the City of Beaumont (City), the San Timoteo Watershed Management Authority (STWMA), and the Yucaipa Valley Water District (YVWD). Specifically, these commitments relate to the implementation of programs to monitor the effects of the maximum benefit objectives on ground and surface water and to address salt management. The STWMA and the City are responsible for the Beaumont Management Zone commitments, and they share responsibility for the San Timoteo Management Zone (STMZ) commitments with the YVWD. The YVWD is responsible for the Yucaipa Management Zone commitments. Tables 1-2 (Table 5-10a in the Amendment) and 1-3 (Table 5-9a in the Amendment) identify the maximum benefit commitments made to the Regional Board by the STWMA and the City and by the YVWD, respectively.

In fulfillment of commitments (1) and (2), the STWMA (in conjunction with the City) and the YVWD submitted proposed ground and surface water monitoring programs for their respective management zones (WEI, 2004; YVWD, 2004). On April 15, 2005, the Regional Board adopted resolutions R8-2005-065 and R8-2005-066, approving the YVWD's and the STWMA and the City's monitoring programs, respectively.

The objective of the groundwater monitoring program (GWMP) is to collect sufficient groundwater quality data such that the triennial recomputation of ambient water quality can be performed (see commitment 6). During the 2004 recomputation, ambient TDS and nitrate-nitrogen concentrations could not be calculated for the STMZ due to insufficient data. Thus, one of the goals of the GWMP's well canvass effort was to locate existing wells in the STMZ

that could be included in the monitoring program.

In March 2007, the two-year well canvass of the region was completed. Figure 1-1 shows the key wells selected for continued monitoring of the Beaumont, Yucaipa and San Timoteo Management Zones. Only five wells were identified for inclusion in the STMZ GWMP. While there are numerous wells in the STMZ, many private well owners either restricted access to their property or chose not to participate in the GWMP.

To date, the key wells were sampled for water quality in November 2006 and November 2007 and are scheduled for another round of sampling in November 2008. Despite the recent data collection efforts, sufficient data was not available for the 2007 ambient water quality recomputation, and therefore, a determination could not be made. Accordingly, in the 2007 Maximum Benefit Monitoring Program Annual Reports submitted by the STWMA and the City and by the YVWD, this lack of data was recognized, and the parties proposed to prepare a workplan to construct new monitoring wells in the STMZ.

1.2 Maximum Benefit Commitment Compliance Status

It is assumed that maximum benefit is demonstrated and that the maximum benefit TDS and nitrate-nitrogen objectives apply to their respective management zones so long as the schedules presented in Tables 1-2 and 1-3 are being met by the STWMA, the City, and the YVWD. If the Regional Board were to determine that the maximum benefit program is not being implemented in accordance with these schedules, they could conclude that the maximum benefit is not being demonstrated and reinstate the antidegradation TDS and nitrate-nitrogen objectives. Were this to occur, the Regional Board would require retroactive mitigation for TDS and nitrate-nitrogen discharges affecting these management zones in excess of the antidegradation objectives.

The Regional Board recently addressed the maximum benefit commitment status of the STWMA and the City and of the YVWD in correspondences dated August 22, 2008 and August 13, 2008, respectively. These letters have been included as Appendix A of this workplan. In these correspondences, the Regional Board declared that the STWMA, the City, and the YVWD have not satisfactorily completed the following tasks:

1) Ambient Groundwater Quality Determination (Commitment 6 in Tables 1-2 and 1-3)
2) Remove/Reduce the Discharge of Effluent from the Unlined Portion of San Timoteo Creek (Commitment 9 in Tables 1-2 and 1-3)

In order to continue to operate under the Maximum Benefit Program, the Regional Board has set forth the following requirements for the committed agencies, to be completed no later than October 31, 2008:

1) Develop a workplan and schedule for the installation of monitoring wells in the San Timoteo Management Zone that will provide adequate data for the calculation of ambient groundwater quality

2) Provide an engineering plan to reduce recycled water flows into Coopers Creek and an analysis and evaluation of water quality impacts related to the use of recycled water in the Beaumont and San Timoteo Management Zones

This report is in fulfillment of the first requirement and contains a plan and schedule for the installation of new wells to augment the existing groundwater monitoring program in the STMZ.

1.3 STMZ Monitoring Program Expansion Objectives

In response to the lack of sufficient groundwater level and groundwater quality data needed to determine ambient water quality in the STMZ, the STWMA, the City, and the YVWD have prepared this workplan to augment the STMZ groundwater monitoring network. The goals of the GWMP expansion are as follows:

- To determine the location, number, and construction details for a network of new monitoring wells in the STMZ
- To improve the understanding of the spatial and vertical variability of water quality in the STMZ
- To collect the requisite data to perform an ambient water quality determination in the STMZ by the 2012 recomputation

1.4 Report Organization

Section 1 Introduction: This section describes the project background, summarizes the workplan objectives, and provides an outline for this workplan.

Section 2 Monitoring Well Program Design: Section 2 details the analysis of existing information used to design the monitoring well program and determine site selection criteria for new well construction.

Section 3 Well Construction: Section 3 details the steps that will be taken to execute the construction of the new monitoring wells proposed in the STMZ.

Section 4 Implementation Plan: Section 4 provides the construction and monitoring plan cost opinion, financing information, and a schedule for implementation.

Section 5 References: Section 5 provides references for the sources consulted in the development of this workplan.

Table 1-1
Maximum Benefit and Antidegradation Objectives for TDS and Nitrate-Nitrogen

Management Zone	TDS Objectives (mg/L)		Nitrate-Nitrogen Objectives (mg/L)	
	Maximum Benefit	Antidegradation	Maximum Benefit	Antidegradation
Beaumont	330	230	5	1.5
San Timoteo	400	300	5	2.7
Yucaipa	370	320	5	4.2

Table 1-2
STWMA and City of Beaumont Maximum Benefit Commitments

Description of Commitment	Compliance Date – as soon as possible, but no later than
1. Surface Water Monitoring Program	
a. Submit Draft Monitoring Program to Regional Board	a. February 24, 2005
b. Implement Monitoring Program	b. Within 30 days from date of Regional Board approval of monitoring plan
c. Quarterly data report submittal	c. April 15, July 15, October 15, January 15
d. Annual data report submittal	d. April 15th
2. Groundwater Monitoring Program	
a. Submit Draft Monitoring Program to Regional Board	a. February 24, 2005
b. Implement Monitoring Program	b. Within 30 days from date of Regional Board approval of monitoring plan
c. Annual data report submittal	c April 15th
3. Desalter(s) and Brine Disposal Facilities	
a. Submit plan and schedule for construction of desalter(s) and brine disposal facilities. Facilities are to be operational as soon as possible but no later than 7 years from date of Regional Board approval of plan/schedule.	a. Within 6 months of either of the following: i. When Beaumont's effluent 5-year running average TDS exceeds 480 mg/L; and/or ii. When volume weighted average concentration in the Beaumont MZ of TDS exceeds 320 mg/L
b. Implement the plan and schedule	b. Within 30 days from date of Regional Board approval of monitoring plan
4. Non-potable water supply	
Implement non-potable water supply system to serve water for irrigation purposes. The non-potable supply shall comply with a 10-year running average TDS concentration of 390 mg/L or less	January 24, 2015

Table 1-2
STWMA and City of Beaumont Maximum Benefit Commitments

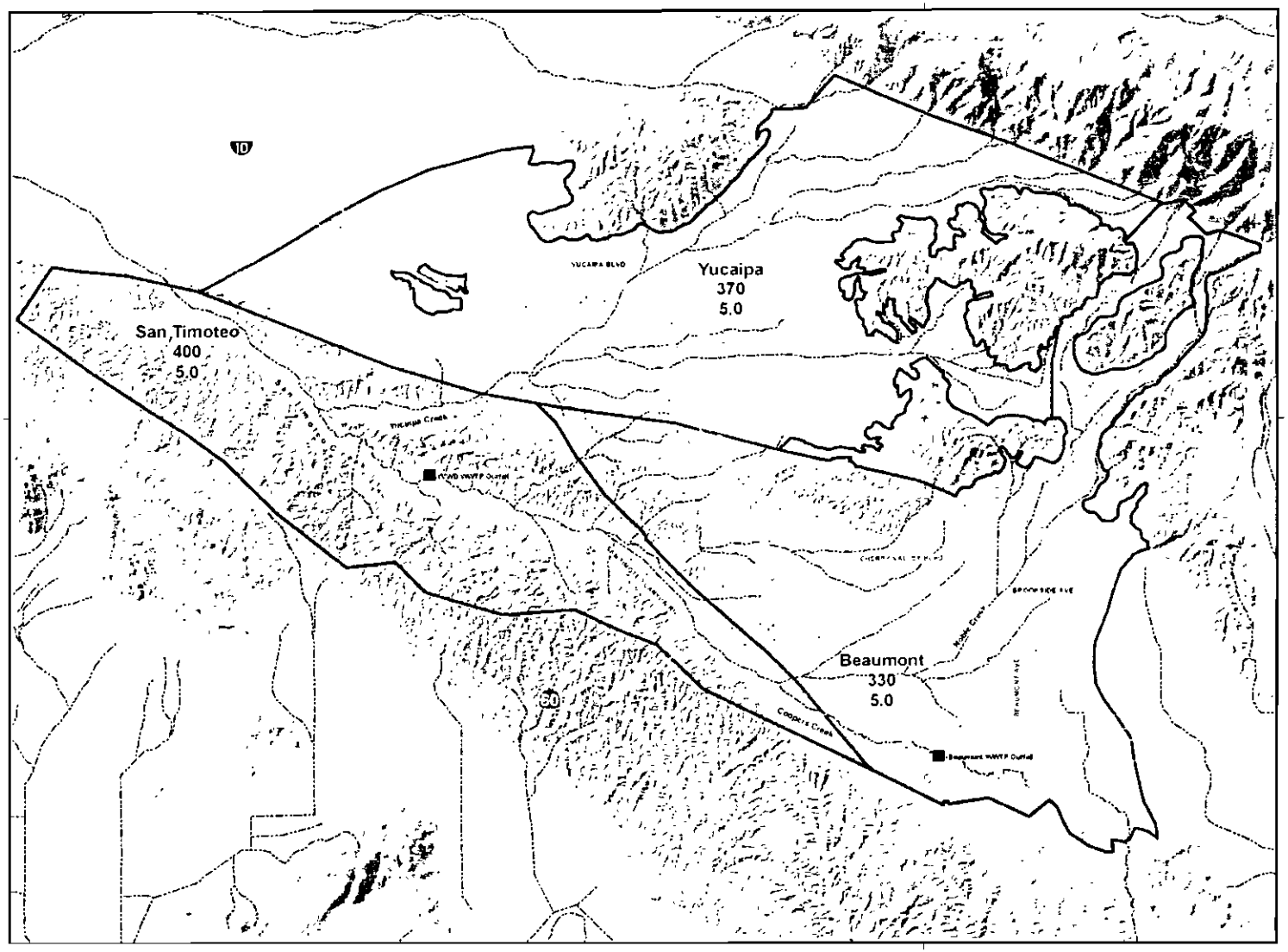
Description of Commitment	Compliance Date – as soon as possible, but no later than
5. Recycled water recharge The recharge of recycled water in the Beaumont or San Timoteo Management Zones shall be limited to the amount that can be blended with other recharge sources to achieve a 5-year running average equal to or less than the "maximum benefit" objectives for TDS and nitrate-nitrogen for the relevant Management Zone(s).	Compliance must be achieved by end of 5th year after initiation of recycled water use/recharge operations.
a. Submit baseline report of amount, locations, and TDS and nitrogen quality of stormwater/imported water recharge.	a. Prior to initiation of construction of basins/other facilities to support enhanced stormwater/imported water recharge.
b. Submit documentation of amount, TDS and nitrogen quality of all sources of recharge and recharge locations. For stormwater recharge used for blending, submit documentation that the recharge is the result of City of Beaumont/STWMA enhanced recharge facilities/programs.	b. Annually, by January 15th, after initiation construction of facilities/implementation of programs to support enhanced recharge.
6. Ambient groundwater quality determination	July 1, 2005 and every 3 years thereafter
7. Replace denitrification facilities (necessary to comply with TIN wasteload allocation specified in Table 5-5)	Compliance with 6 mg/L TIN limitation to be achieved by (*3 years from effective date of this Basin Plan amendment*)
8. City of Beaumont recycled water quality improvement plan and schedule	
a. Submit plan and schedule	a. 60 days after the TDS 12-month running average effluent quality equals or exceeds 490 mg/L for 3 consecutive months and/or the 12-month running average TIN concentration equals or exceeds 6 mg/L in any month (once replacement denitrification facilities are in place)
b. Implement plan and schedule	b. Upon approval by Regional Board
9. Remove/reduce the discharge of Beaumont's effluent from the unlined portion of San Timoteo Creek	
a. Submit proposed plan/schedule	a. *(*6 months from effective date of this Basin Plan amendment)*
b. Implement plan and schedule	b. Upon Regional Board approval

Table 1-3
Yucaipa Valley Water District Maximum Benefit Commitments

Description of Commitment	Compliance Date – as soon as possible, but no later than
1. Surface Water Monitoring Program	
a. Submit Draft Monitoring Program to Regional Board	a. (*30 days from date of approval of this amendment*)
b. Implement Monitoring Program	b. Within 30 days from date of Regional Board approval of monitoring plan
c. Quarterly data report submittal	c. April 15, July 15, October 15, January 15
d. Annual data report submittal	d. February 15th
2. Groundwater Monitoring Program	
a. Submit Draft Monitoring Program to Regional Board	a. (*30 days from date of approval of this amendment*)
b. Implement Monitoring Program	b. Within 30 days from date of Regional Board approval of monitoring plan
c. Annual data report submittal	c. February 15th
3. Desalter(s) and Brine Disposal Facilities	
a. Submit plan and schedule for construction of desalter(s) and brine disposal facilities. Facilities are to be operational as soon as possible but no later than 7 years from date of Regional Board approval of plan/schedule.	a. Within 6 months of either of the following: i. When YVWD's effluent 5-year running average TDS exceeds 530 mg/L; and/or ii. When volume weighted average concentration in the Yucaipa MZ of TDS exceeds 360 mg/L
b. Implement the plan and schedule	b. Within 30 days from date of Regional Board approval of monitoring plan
4. Future desalters plan and schedule submittal	October 1, 2005 Implement plan and schedule upon Regional Board approval

Table 1-3
Yucaipa Valley Water District Maximum Benefit Commitments

Description of Commitment	Compliance Date – as soon as possible, but no later than
5. Recycled water recharge The recharge of recycled water in the Yucaipa or San Timoteo Management Zones shall be limited to the amount that can be blended with other recharge sources to achieve a 5-year running average equal to or less than the "maximum benefit" objectives for TDS and nitrate-nitrogen for the relevant Management Zone(s).	Compliance must be achieved by end of 5th year after initiation of recycled water use/recharge operations.
a. Submit baseline report of amount, locations, and TDS and nitrogen quality of stormwater/imported water recharge.	a. Prior to initiation of construction of basins/other facilities to support enhanced stormwater/imported water recharge.
b. Submit documentation of amount, TDS and nitrogen quality of all sources of recharge and recharge locations. For stormwater recharge used for blending, submit documentation that the recharge is the result of YVWD enhanced recharge facilities/programs.	b. Annually, by January 15th, after initiation construction of facilities/implementation of programs to support enhanced recharge.
6. Ambient groundwater quality determination	July 1, 2005 and every 3 years thereafter
7. Replace denitrification facilities (necessary to comply with TIN wasteload allocation specified in Table 5-5)	New facilities shall be operational no later than *("3 years from effective date of this Basin Plan amendment")*
8. YVWD recycled water quality improvement plan and schedule	
a. Submit plan and schedule	a. 60 days after the TDS 12-month running average effluent quality equals or exceeds 530 mg/L for 3 consecutive months and/or the 12-month running average TIN concentration equals or exceeds 6 mg/L in any month (once replacement denitrification facilities are in place)
b. Implement plan and schedule	b. Upon approval by Regional Board
9. Remove/reduce the discharge of YVWD effluent fro the unlined portion of San Timoteo Creek	
a. Submit proposed plan/schedule	a. *("6 months from effective date of this Basin Plan amendment)*
b. Implement plan and schedule	b. Upon Regional Board approval
10. Construct the Western Regional Interceptor for Dunlap Acres	
a. Submit proposed construction plan and schedule. The schedule shall assure the completion of construction as soon as possible but no later than January 1, 2010.	a. *("6 months from effective date of this Basin Plan amendment)*
b. Implement plan and schedule	b. Upon Regional Board approval



Key Groundwater Quality Monitoring Program

Wells Monitored for Groundwater Quality

Management Zone Labeling Key

Beaumont — Management Zone Name

330 — TDS Maximum Benefit Objective

5.0 — Nitrate-Nitrogen Maximum Benefit Objective

Management Zone Boundary

Other Features

Recycled Water Discharge Location

Rivers and Streams

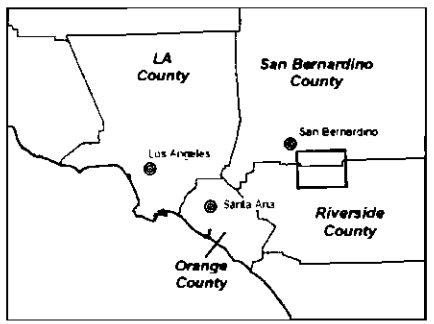
Geology

Unconsolidated Sediments

Quaternary Alluvium

Semi-consolidated Sediments & Consolidated Bedrock

Undifferentiated Pre-Tertiary to Early Pleistocene Igneous, Metamorphic, and Sedimentary Rocks



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STWMA/City of Beaumont & YVWD

Maximum Benefit Monitoring Program

STMZ Monitoring Well Workplan

Water Quality Key Wells

Groundwater Quality Monitoring Program

Figure 1-1

Section 2 – Monitoring Well Site Selection

2.1 Review of Existing Information

The STMZ is underlain by alluvial sediments and the San Timoteo Formation. The recent Holocene alluvium consists of unconsolidated clay, silt, sand, and gravel. The San Timoteo Formation consists of older, Pliocene-Pleistocene age unconsolidated to consolidated, occasionally cemented clay, silt, sand, and gravel. The outcrop of the San Timoteo Formation along San Timoteo Canyon forms high, sharp hills on both sides of the canyon, which is bisected by the San Timoteo Wash from southeast to northwest. In general, the porosity and permeability of the San Timoteo Formation is less than that of the alluvium.

There are relatively few high quality logs for wells constructed in the STMZ that provide a deeper understanding of the basin. Figure 2-1 shows the complete distribution of known wells (determined through the review of well logs on file with the California Department of Water Resources [DWR] and various well canvassing exercises) as well as information regarding well construction, water quality, and water levels. Most wells are constructed to a depth of less than 400 feet below ground surface (bgs), and the limited[1] data provided in the DWR well logs suggest that specific capacity and yields are highly variable down the canyon (Table 2-1).

The wells that were recently constructed by the Metropolitan Water District of Southern California (MWD) during the design of their Inland Feeder Tunnel provide a unique source of high quality data pertinent to the hydrogeology of the STMZ. Figure 2-2 provides a cross-section through the canyon along the line of the Inland Feeder Tunnel wells. The work performed by the MWD revealed the following:

- Groundwater inflows (after grouting) to the section of the Inland Feeder Tunnel within San Timoteo Canyon are exceptionally low (estimated at < 20 gallons per minute for the length of the cross-section). In particular, inflows are lower where the tunnel passes through the San Timoteo Formation, compared to the sections that pass through the alluvium (see Figure 2-2).

- During tunnel construction, the dewatering operation failed to lower the groundwater level below the level of the tunnel invert. This was probably due to the low permeability of the alluvial sediments.

- Packer testing of the boreholes constructed in the San Timoteo Formation indicated low hydraulic conductivity values.

- The depth of alluvial sediments at the cross-section is less than 150 feet.

[1] DWR records have a field for reporting pump tests. This field consists of yield, drawdown, and test duration. However, further information is rarely reported, and it is not possible to determine the method of testing (i.e. if it was a step test, a constant rate test, or simply pumping for development).

Based on the general geology, it would seem reasonable to conclude that the alluvium, being less consolidated than the San Timoteo Formation, forms a better aquifer. And, inflows to the Inland Feeder Tunnel, as well as the aquifer's response to the MWD's dewatering operation, seem to further support that the San Timoteo Formation is of limited use as an aquifer.

Nevertheless, drillers' experiences in the STMZ seem to suggest otherwise. The logs of both the Inland Feeder Wells and the Fisherman's Retreat Well show the depth of alluvial sediments to be less than 150 feet. However, given that the majority of wells in the unit were drilled to depths between 150 to 400 feet bgs seems to indicate that at least part of the San Timoteo Formation is useful as an aquifer.

Furthermore, the depth of alluvial sediments at the Heartland production well is only 35 feet, yet it is screened between 160 and 540 feet bgs. The fact that the San Timoteo Formation is only found beneath the alluvium in this area (the outcrop of the San Timoteo Formation is not observed near the Heartland Well) indicates greater consolidation and cementation of the formation in the San Timoteo Canyon, compared to other nearby areas.

Based on the findings of the MWD study, the variability in depth of alluvial sediments between the Heartland Well and the central section of the STMZ, and the variability of yields and specific capacities found in DWR logs, it is reasonable to conclude that the lithology and yields in both the alluvium and San Timoteo Formation are variable—both spatially and vertically—throughout the STMZ. Although the Heartland, Fisherman's Retreat, and MWD well logs (included as Appendix B of this workplan) provide further insight into the hydrogeology of the STMZ, the fact remains that beyond existing well depths, very little is known about the hydrogeology of the eastern and western sections of the STMZ. Construction of new monitoring wells in these areas will improve the overall understanding of the active aquifer system and provide the data needed to compute the ambient water quality of the STMZ.

2.2 Approach to Monitoring Network Expansion

Figure 2-3 shows the distribution of existing wells in the monitoring network. This network includes the five wells identified in the initial well canvass for the GWMP and three additional wells discovered during field canvassing efforts related to the creation of this workplan. While it is tempting to fill the remaining spatial gaps of the GWMP through additional well canvassing, lithological data from new construction (discussed in Section 3.1) is considered to be extremely important in improving aquifer characterization, especially in the western half of the STMZ. It is highly unlikely that the information provided by this new construction can be obtained from existing wells, especially given the historical difficulty in obtaining cooperation from private well owners. A new construction approach, coupled with a year of intensive groundwater monitoring (see Section 3.3), will allow for a more accurate determination of the lateral and vertical variability of water quality within the STMZ.

2.3 Site Selection Criteria for New Wells

The following criteria were used to propose locations for the construction of new monitoring wells:

- Sites should aim to fill existing spatial gaps in the monitoring network.
- Wells should yield water quality samples from the active aquifer, and therefore, sites should be located centrally within the alluvium of San Timoteo Canyon.
- Sites should have an area suitable to accommodate the footprint of well drilling equipment.
- Sites should be easily accessible due to frequent visits required by the GWMP.
- Sites on publicly owned land are preferred to those on privately owned land as it is typically easier to negotiate an easement for temporary use of the land for construction.
- Sites should be located on land that is already disturbed by existing activities in order to minimize damage to environmental resources.

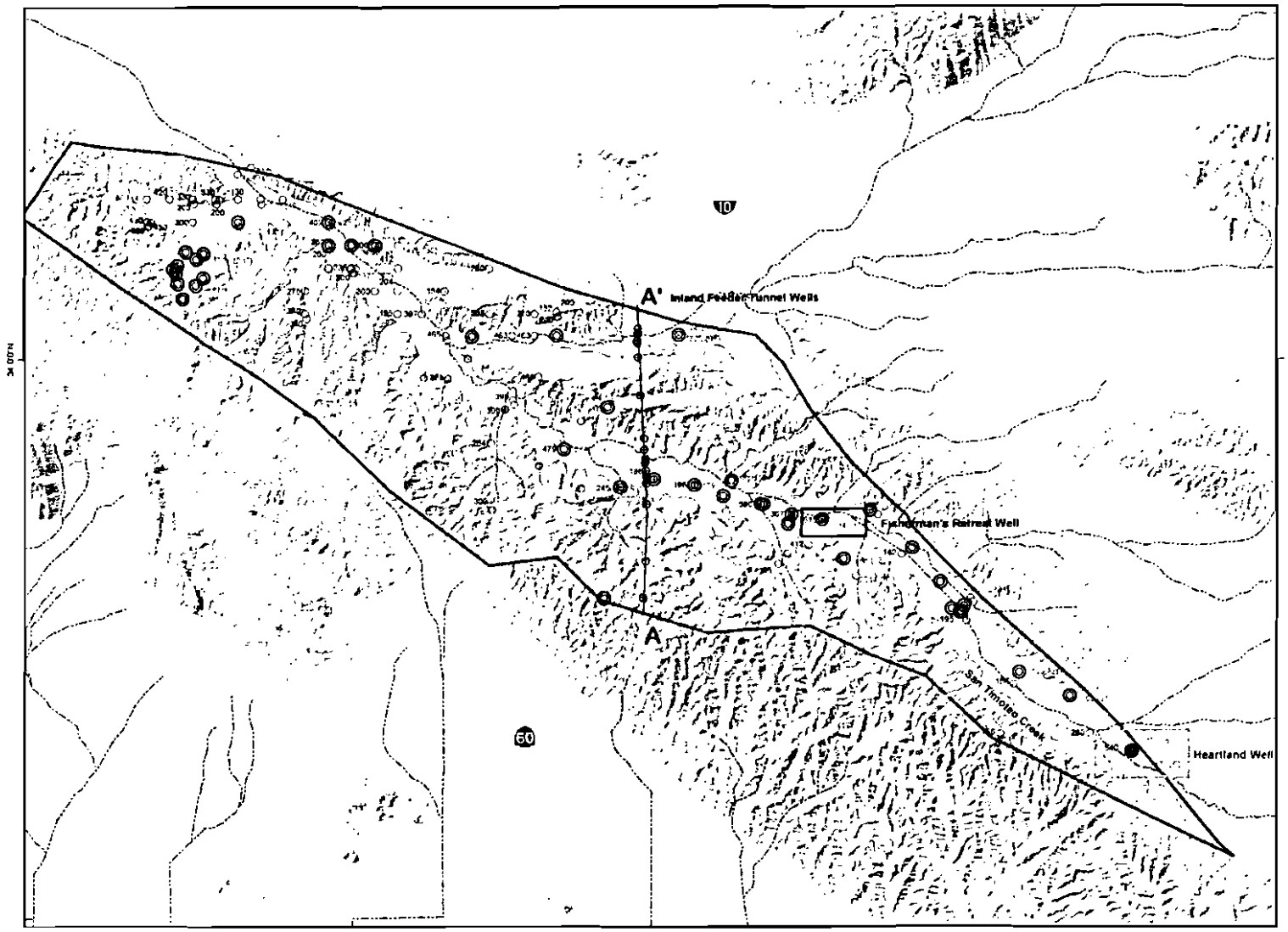
A GIS overlay analysis of existing well sites, surface geology, aerial photography, and parcel data from the San Bernardino and Riverside County Assessor's Offices was used to select monitoring well locations according to the aforementioned criteria. Based on the overlay analysis, the three wells will be sited in the following locations:

1. One well will be sited in the relatively wide alluvial plain near the northwest mouth of the canyon where the aquifer is considered poorly characterized. This area also likely represents one of the larger areas of alluvial storage in the canyon and is the best place to characterize water flowing out to the Bunker Hill Management Zone.
2. One well will be sited at the confluence of Live Oak Canyon and San Timoteo Canyon. There are relatively few wells in the area, and a well placed in this location will aid in characterizing any subsurface flow from Live Oak Canyon.
3. One well will be sited in the southeast part of the canyon to fill the spatial gap between the Fisherman's Retreat Well and the Heartland Well.

Figure 2-3 indicates the conceptual location of the proposed wells within the broad areas indicated above. Given the visual detail of the GIS information used in the overlay analysis, a large map containing these data has been included as Appendix C. Site visits were conducted to confirm the suitability of these sites, and notes and photographs from these reconnaissance efforts have been included as Appendix D.

Table 2-1
Specific capacity and yields of wells in the STMZ

WEID	Yield	Drawdown	Specific Capacity
	gpm	ft	gpm/ft
1003049	900	169	5.3
1201608	750		
1201582	540	120	4.5
1201615	300		
1003109	250	102	2.5
1201611	200		
1201612	200		
1003079	165	74	2.2
1201613	150	123	1.2
1201591	100		
1201592	100		
1201593	75		
1003080	55	170	0.3
1201599	40		
1201617	40		
1201602	30		
1201610	25	81	0.3
1003048	20	80	0.3
1201594	20		
1201598	20		
1201603	20		
1201595	18		
1201601	10		



Key to Well Construction Details

Well
In well canvas
Max perf depth 359
Median TDS mg/l (No. of measurements)
Median GWL ft asl (ft bgs)
Has lithological log
In sampling program

San Timoteo Management Zone Boundary

Line of Cross Section (Figure 2-2)

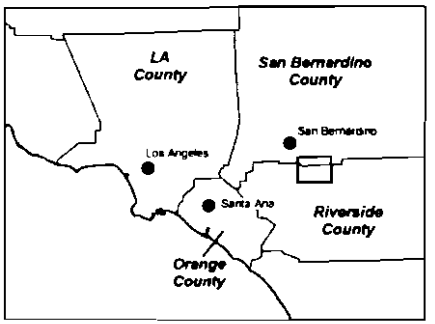
Geology

Unconsolidated Sediments

Quaternary Alluvium

Semi-Consolidated Sediments & Consolidated Bedrock

Undifferentiated Pre-Tertiary to Early Pleistocene Igneous, Metamorphic, and Sedimentary Rocks



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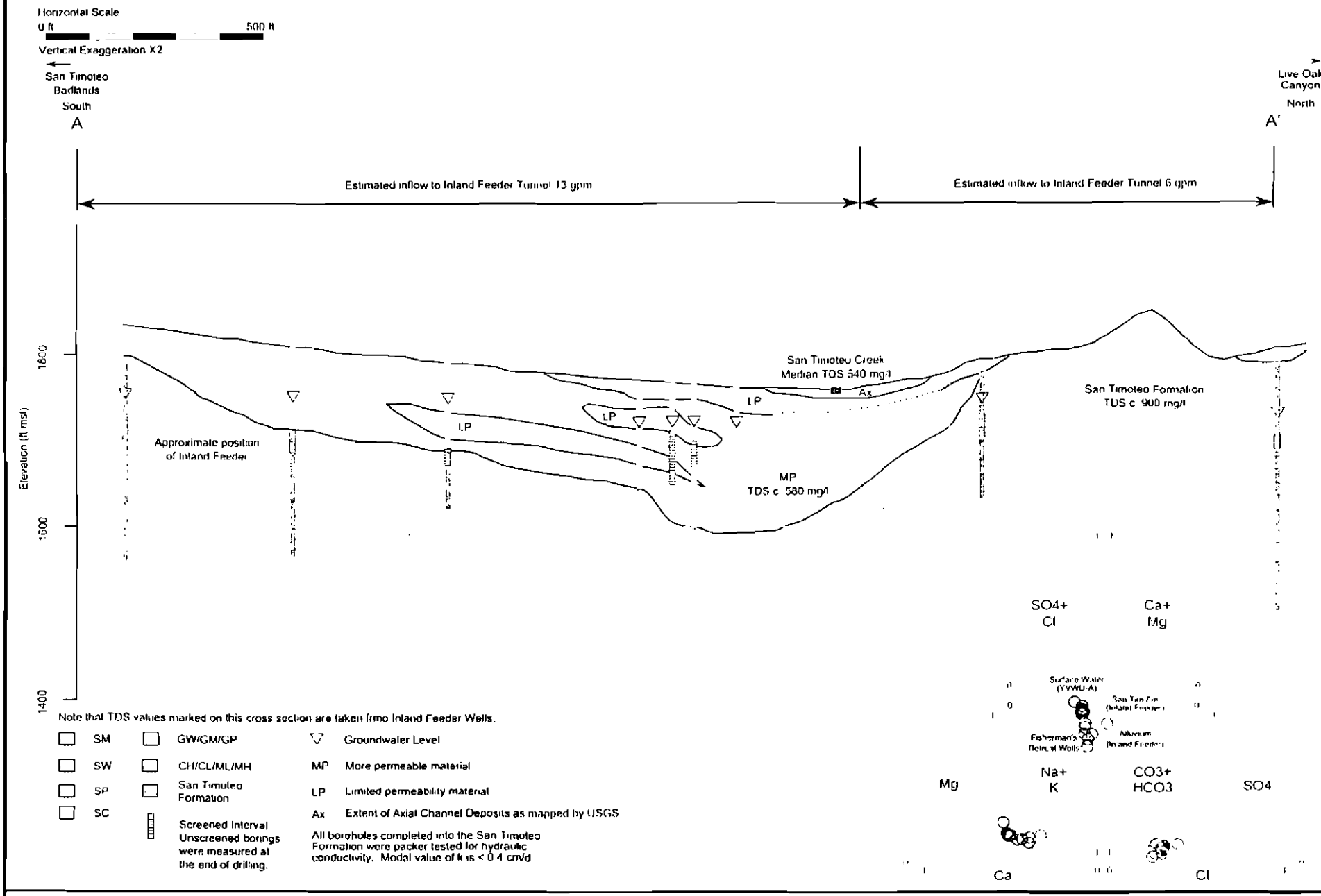
STWMA/City of Beaumont & YVWD
Maximum Benefit Monitoring Program
STMZ Monitoring Well Workplan

Distribution of Known Wells in the San Timoteo Management Zone

Figure 2-1



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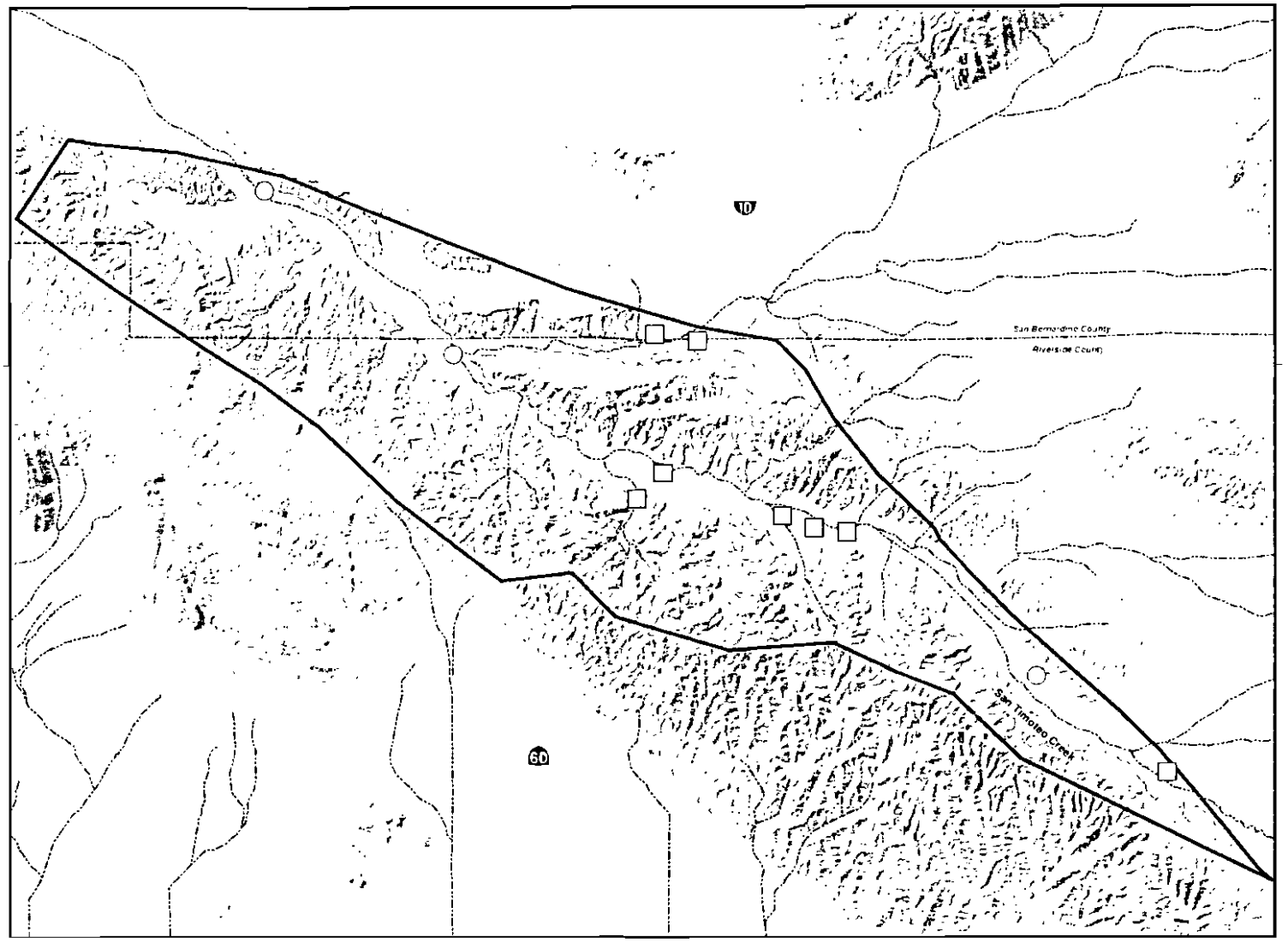
San Timoteo Management Zone Cross Section

Figure 2-2



Existing Wells added to program in 2008

Existing Wells added to Program in 2008

Proposed New Construction in 2009

San Timoteo Management Zone Boundary

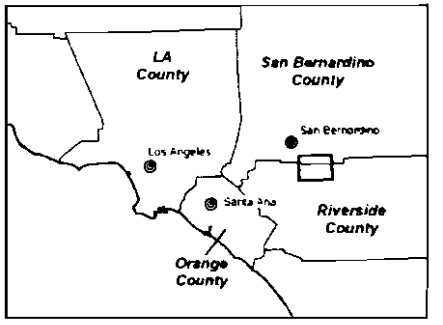
Geology

Unconsolidated Sediments

Quaternary Alluvium

Semi-Consolidated Sediments & Consolidated Bedrock

Undifferentiated Pre-Tertiary to Early Pleistocene Igneous Metamorphic, and Sedimentary Rocks



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Date: 20081023

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STWMA/City of Beaumont & YVWD

Maximum Benefit Monitoring Program

STMZ Monitoring Well Workplan

Proposed Groundwater Monitoring Network

Groundwater Quality Monitoring Program

Figure 2-3

Section 3 –Well Construction

3.1 Planning

3.1.1 Site Acquisition

For the purposes of site acquisition, the wells will be owned by the STWMA. The STWMA will contact the property owner—as determined from Assessor's Office parcel data—and negotiate an easement to allow for well construction. The STWMA will also secure any necessary permits for the temporary occupation and use of land or roadways and for the discharge of water during construction.

3.1.2 CEQA

As required by the California Environmental Quality Act (CEQA), the STWMA will carry out an *Initial Study*, as defined by CEQA, to identify the environmental impacts of the construction project and determine whether any identified impacts are "significant." If the impacts are "significant," solutions to mitigate these impacts will be explored in order to satisfy a Mitigated Negative Declaration. Otherwise, a new site will be proposed within the general vicinity of the proposed locations. CEQA site assessments will be repeated, and if environmental impacts are unavoidable at the selected construction sites, an Environmental Impact Report will be prepared.

3.1.3 Initial Investigations

A more detailed investigation of existing wells will reduce some of the hydrogeologic uncertainty identified in Section 2.1. To make an assessment of the relative contributions of the alluvium and San Timoteo Formation to the productive aquifer, an investigation will be carried out to identify the source of water in the Fisherman's Retreat Well. The Fisherman's Retreat Well was selected for this analysis as it is likely that it is screened across both the alluvium and the San Timoteo Formation. At a minimum, the investigation will consist of a video survey and a spinner test to refine the depths of the newly constructed wells. Rehabilitation and redevelopment of this well will be considered if the screen is in poor condition.

3.2 Well Construction

The STWMA will engage contractors to prepare plans and specifications for the construction of the new wells and will undertake construction management. The plans and specifications will be used to obtain bids for well construction and to select a contractor to carry out construction. Wells will be constructed in compliance with the latest edition or supplement of the Californian Water Well Standards (DWR 1981, 1991) and other applicable standards.

The three new wells will be constructed to a depth of up to 400 feet to reflect the current use of the aquifer. Lithological and geophysical data obtained during construction will be used to decide the completion depth of each well. Wells will be completed with a 4-inch diameter in order to allow for low-flow water quality sampling. The well casing will consist of Schedule 80 PVC and screening materials. The screen length is anticipated to be 40 feet; although, this may vary, depending on data gathered during drilling.

After drilling and prior to construction, the following geophysical surveys will be run: long normal and short normal resistivity, SP, and natural gamma logs.

Following construction, the wells will be developed by swabbing and bailing as well as airlift, a video log will be run to verify screen condition, and a bladder pump and water level transducer will be permanently installed in each well for use in the sampling program.

A well completion report with findings and conclusions will be submitted to the Regional Board by December 31, 2009

3.3 Groundwater Quality Monitoring

3.3.1 Ambient Water Quality Monitoring Requirements

The goal of the tasks laid out in this workplan is to produce the data necessary to make a determination of the ambient groundwater quality in the STMZ. The ambient water quality of a groundwater management zone is measured using a rigorous statistical method (20-year running averages) devised by the Nitrogen/TDS Task Force. This methodology is documented in *TIN/TDS Study – Phase 2A Final Technical Memorandum* (WEI, 2000).

To compute ambient water quality, TDS and nitrate-nitrogen measurements are averaged for each calendar year. That is, where more than one observation occurs during any given year, only one value—the annual average—is used in the computation. A well may have up to 20 annualized averages; however, a minimum of 3 annualized averages is required for inclusion in the determination.

In addition to the TDS and nitrate-nitrogen data needed for the ambient water quality computation, a series of quality control checks must be performed to ensure the integrity of the data used in the analysis. Table 3-1 lists the minimum chemical parameters required for the computation of ambient water quality.

3.3.2 Monitoring Program Plan

Since the inception of the GWMPs, all wells have been sampled on an annual basis until there are enough annual samples to include a given wells in the ambient groundwater quality determinations. However, given that an understanding of the spatial and vertical variability of water quality in the STMZ is an important element to understanding the active aquifer, all

wells within the STMZ will be sampled on a quarterly basis for one year.

In 2009, when construction is complete, there will be 11 water quality monitoring wells in the STMZ. The first quarterly samples will be collected upon the completion of construction, which is planned for September 2009. Thereafter, the remaining quarterly samples will be collected in December 2009, March 2010, and June 2010. Each well will be sampled according to the ambient water quality data requirements listed in Table 3-1 and results will be reported with the Quarterly Maximum Benefit Monitoring Program reports. Subsequent to the completion of the four quarterly samples, all wells in the STMZ will be sampled annually in accordance with the ambient water quality computation requirements described in Section 3.3. There will be sufficient data from all wells in the GWMP to compute the ambient groundwater quality of the STMZ by the 2012 recomputation.

If upon completion of three new monitoring wells, coupled with a year of quarterly groundwater quality monitoring, the uncertainty regarding the character of the active aquifer remains, the STWMA, the City, and the YVWD will propose further augmentation of the GWMP.

Table 3-1
Analyses Required for
Ambient Water Quality Determination

Analytes of Interest
Alkalinity, Total (as $CaCO_3$)
Bicarbonate
Calcium
Carbonate
Chloride
Electrical Conductivity (Specific Conductance)
Fluoride
Magnesium
Nitrate as NO_3 or Nitrate as N
pH
Potassium
Silica
Sodium
Sulfate
Total Dissolved Solids

4.1 Cost Opinion

Table 4-1 shows a work breakdown structure and cost opinion for the implementation of the STMZ Well Construction and Monitoring Plan. The cost opinion follows the tasks of the workplan, with Task 1 being completed in fiscal 2008/09 and Tasks 2 through 5 being completed in fiscal 2009/10. The total cost, including construction and monitoring, is approximately $472,000. This includes a recommended contingency of ten percent and contains no deductions for outside funding sources that may be available. About 65 percent ($280,000) of the cost is related to well construction, lab costs, and other non-labor direct costs. The remaining 35 percent ($149,000) consists of consultant labor costs for planning, designing, and supervising construction, and for the STMZ GWMP during this period. The total cost share for each party (STWMA/City and YVWD) is $236,000.

4.2 Financing

To assist in the financing of the monitoring well program, the STWMA, the City, and the YVWD will apply for grant funding through the DWR's Local Groundwater Assistance program. This program is for local public agencies with management responsibility over groundwater resources to carry out groundwater data collection, modeling, monitoring, and other basin management tasks, including the construction of new monitoring networks. Applications will be submitted in March 2009, and if awarded, funding will be available in FY2010. Local Groundwater Assistance grants typically award up to $250,000 to selected projects. If received, this grant will cover approximately one half of the total project cost.

4.3 Implementation Schedule

Table 5-2 details the schedule for implementing the steps outlined in this workplan. These steps are summarized below.

- January 2, 2009: The Regional Board approves the workplan and directs the STWMA to implement
- March 2009: Submit DWR Local Groundwater Assistance Program application
- June 30, 2009: The STWMA acquires access to sites, completes well design, and selects contractor(s) for monitoring well construction
- September 30, 2009: Construction is completed and groundwater monitoring begins
- December 31, 2010: Well completion report, detailing findings and conclusions, is submitted to the Regional Board
- June 30, 2013: Assessment of ambient water quality in the STMZ is completed

Table 4-1
Work Breakdown Structure and Fee Estimate for Groundwater Monitoring Program Expansion

Phase and Task Descriptions	Labor		Other Direct Charges							Total Costs	
	Person Days	Cost	Travel	New Equipment	CEQA Consultant	Drilling Contractors	Laboratory	Reproduction	Total ODCs	Subtask	Task
Task 1 Planning - Fiscal Year 2008/09											**$46,560**
1.1 Perform CEQA Analysis	1	$1,200			$16,500				$16,500	$17,700	
1.2 Prepare AB-303 Grant Application	19	$25,040	$500					$500	$1,000	$26,040	
1.3 Meet With and Assist STWMA/YVWD with Well Site Acquisition	2	$2,720	$100						$100	$2,820	
Task 2 Initial Investigation - Fiscal Year 2009/10											**$17,453**
1.1 Fisherman's Retreat Well Spinner Test	3	$3,600	$100			$10,000			$10,100	$13,700	
1.2 Well Survey	3	$3,600	$153						$153	$3,753	
Task 3 Construct Monitoring Wells - - Fiscal Year 2009/10											**$295,992**
3.1 Plans and Specifications for Monitoring Wells	8	$9,520								$9,520	
3.2 Obtain Permits	2	$2,160	[illegible]						$200	$2,360	
3.3 Assist Agencies to Prepare Bid Package, Select Contractor and [illegible] Contract	7.5	$9,960								$9,860	
3.4 Drill Boreholes and Construct, Develop and Equip Wells [illegible]	37.5	$35,880	[illegible]	$9,000		$225,774	$1,250		[illegible]	[illegible]	
Task 4 Prepare Well Completion Report - - Fiscal Year 2009/10											**$23,950**
4.1 Prepare Draft Report	11.25	$14,170								$14,170	
4.2 Review Draft Report with YVWD and STWMA	2.5	$3,540	$100						$100	$3,640	
4.3 Prepare Final Report	5	$5,140						$1,000	$1,000	$6,140	
Task 5 Intensive monitoring of STM2 wells - Fiscal Year 2009/10	35	$32,400	$2,264				$10,600		$12,864	$45,264	**$45,264**
Subtotal											**$429,219**
Contingency at 10%											$42,922
Total	**138.75**	**$148,830**	**$5,765**	**$9,000**	**$16,500**	**$235,774**	**$11,850**	**$1,500**	**$280,389**		**$472,140**

Table 4-2
Workplan Implementation Schedule

Completion Date	Task
October 31, 2008	The STWMA, the City, and the YVWD submit Workplan for the STMZ GWMP
January 2, 2009	The Regional Board approves Workplan and directs the agencies to implement
March 31, 2009	Submit Local Groundwater Assistance Program application to acquire funding for construction and monitoring
June 30, 2009	The STWMA acquires access to sites, completes well design, and selects contractors for well construction
September 30, 2009	Monitoring well construction is completed and quarterly groundwater monitoring begins
December 31, 2009	Well Completion Report, detailing findings and conclusions, is submitted to the Regional Board for review
June 30, 2013	The STWMA, the City, and the YVWD submit an Ambient Water Quality determination for the STMZ

Section 5 – References

California Department of Water Resources. (1991). *California Well Standards, Bulletin 74-90.*

California Department of Water Resources. (1981). *California Well Standards, Bulletin 74-81.*

California Regional Water Quality Control Board, Santa Ana Region. (2004). *Resolution No. R8-2004-0001—Resolution Amending the Water Quality Control Plan for the Santa Ana River Basin to Incorporate an Updated Total Dissolved Solids (TDS) and Nitrogen Management Plan for the Santa Ana Region Including Revised Groundwater Subbasin Boundaries, Revised TDS and Nitrate-Nitrogen Quality Objectives for Groundwater, Revised TDS and Nitrogen Wasteload Allocations, and Revised Reach Designations, TDS and Nitrogen Objectives and Beneficial Uses for Specific Surface Waters.*

California Regional Water Quality Control Board, Santa Ana Region. (2005). *Resolution No. R8-2005-0065—Resolution Approving the San Timoteo and Yucaipa Management Zones Maximum Benefit Surface Water and Groundwater Monitoring Program Proposals as Required in the Total Dissolved Solids and Nitrogen Management Plan Specified in the Water Quality Control Plan for the Santa Ana River Basin.*

California Regional Water Quality Control Board, Santa Ana Region. (2005). *Resolution No. R8-2005-0066—Resolution Approving the San Timoteo and Beaumont Management Zones Maximum Benefit Surface Water and Groundwater Monitoring Program Proposals as Required in the Total Dissolved Solids and Nitrogen Management Plan Specified in the Water Quality Control Plan for the Santa Ana River Basin.*

Wildermuth Environmental, Inc. (2000). *TIN/TDS Phase 2A: Tasks 1 through 5, TIN/TDS Study of the Santa Ana Watershed, Technical Memorandum.*

Wildermuth Environmental, Inc. (2004). *San Timoteo Watershed Management Program Draft Maximum Benefit Monitoring Plan.*

Yucaipa Valley Water District. (2004). *Monitoring Program for the Yucaipa Management Zone and San Timoteo Management Zone.*

Appendix A

Regional Board Letters

California Regional Water Quality Control Board
Santa Ana Region

Linda S. Adams
Secretary for
Environmental Protection

3737 Main Street, Suite 500, Riverside, California 92501-3348
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Arnold Schwarzenegger
Governor

August 13, 2008

Mr. Joe Zoba, General Manager
Yucaipa Valley Water District
12770 Second Street
Yucaipa, CA 92399

MAXIMUM BENEFIT COMMITMENT STATUS

Dear Mr. Zoba:

On January 15, 2008, I wrote to you to inquire about Yucaipa Valley Water District's (YVWD) progress toward meeting the maximum benefit commitments specified for YVWD in the Basin Plan. On February 12, 2008, you responded to my inquiry with a letter, which provided an update on the status of implementation of YVWD's commitments. In addition, by a letter dated April 15, 2008 your consultant, Wildermuth Environmental, Inc. (WEI), submitted the 2007 Annual Report for the Maximum Benefit Monitoring Program. My staff have reviewed both of these submittals and have determined that YVWD has met most of the maximum benefit commitments. However, as discussed below, YVMD has not satisfactorily completed the following two tasks: 1) Ambient Groundwater Quality Determination, and 2) Remove/Reduce the Discharge of YVWD Effluent from the Unlined Portion of San Timoteo Creek. This places YVWD's maximum benefit program in jeopardy. As you know, the failure to implement maximum benefit commitments will result in significant water quality and regulatory consequences, so it is imperative that these commitments be addressed immediately. Specifically, YVWD must take action to address the following:

1) Beginning in 2005 and every three years thereafter, YVWD is required to recalculate the ambient groundwater quality for the Yucaipa, and San Timoteo groundwater Management Zones[1]. The recalculation was conducted by WEI for Yucaipa Management Zone in 2005 and in 2008. However, the re-calculation was not performed for the San Timoteo Management Zone in both years due to insufficient data. This issue was raised in prior discussions with you and at N-TDS/Basin Monitoring Task Force meetings. A review of the above–referenced 2007 Annual Report and the recalculation reports confirms that water quality data, and monitoring

[1] In addition to YVWD, responsibility for recalculation of ambient groundwater quality for the San Timoteo Management Zone also rests with the San Timoteo Watershed Management Authority and the City of Beaumont pursuant to their maximum benefit implementation program.

wells necessary to provide these data, are inadequate in the San Timoteo Management Zone.

In order to continue to operate under the maximum benefit program, including waste discharge limitations based on the maximum benefit objectives, YVWD is hereby required to develop a workplan and schedule for the installation of monitoring wells in the San Timoteo Management Zone that will provide adequate data for calculation of the ambient groundwater water quality. This workplan and schedule must be submitted to the Regional Board Executive Officer for approval by October 31, 2008 and is to be implemented upon his approval. Regional Board staff will evaluate the proposed workplan to ensure that proposed monitoring well locations are adequately spaced within the San Timoteo Management Zone. Our expectation is that the proposed schedule for this effort will result in completion of the well installation program as soon as possible. In short, the proposed workplan and schedule must be well justified.

2) YVWD's maximum benefit implementation plan specifies that by June 23, 2005, YVWD is to develop a plan and schedule to remove/reduce the discharge of effluent to the unlined portion of San Timoteo Creek. To date, we have not received a plan and schedule from YVWD. Your February 12, 2008 letter indicates that YVWD is working with the resource agencies to complete the environmental documentation and that YVWD has previously submitted an "...adaptive management plan [proposal]..." to the Regional Board in 1996 and 2001. However, these documents do not constitute the required plan and schedule for reduction/removal of effluent from San Timoteo Creek.

While we understand that negotiations are continuing and appreciate the difficulty that may be encountered in securing compliance with the California Environmental Quality Act and the National Environmental Policy Act (NEPA), we believe that specific plans and schedules can be developed taking these and other considerations into account. A critical path and schedule can be identified, along with alternative scenarios that will be implemented if necessitated by circumstances, such as the inability to achieve CEQA/NEPA compliance. Again, this plan and schedule is long overdue. Therefore, a proposed plan and schedule must be submitted to the Regional Board Executive Officer for review and approval as soon as possible, but no later than October 31, 2008.

Finally, since most of the monitoring required of YVWD overlaps with that being conducted by San Timoteo Watershed Management Authority/City of Beaumont as part of their maximum benefit program, we request that the annual report prepared and submitted on behalf of YVWD by your consultant be combined with the report for San Timoteo Watershed Management Authority/City of Beaumont. We believe it is more appropriate and useful to present and summarize the data for each management zone, rather than for each agency.

A similar issue with respect to implementation of maximum benefit commitments exists for Chino Basin Watermaster (Watermaster)/Inland Empire Utilities Agency (IEUA). To address the Watermaster/IEUA issues, I have scheduled an item at the September 5, 2008 Regional Board meeting for the Watermaster/IEUA to provide information to the Board on the status of their maximum benefit commitments. I may also schedule a similar presentation at a future Regional Board meeting to review the status of YVWD's maximum benefit status, including the option of scheduling a hearing to consider whether the application of the maximum benefit objectives continues to be appropriate.

If you have any questions about these comments or the maximum benefit requirements, please feel free to contact me at (951)782-3284. You may also contact Hope Smythe at (951)782-4493 (hsmythe@waterboards.ca.gov), or Cindy Li at (951)782-4906 (cli@waterboards.ca.gov).

Sincerely,

Gerard J. Thibeault
Executive Officer

cc:
Mark Wildermuth, Wildermuth Environmental, Inc.,
mwildermuth@wildermuthenvironmental.com
Mark Norton, Santa Ana Watershed Project Authority, mnorton@sawpa.org
J. Andrew Schlange, San Timoteo Watershed Management Agency, jasa921@aol.com
Deepak Moorjani, City of Beaumont, dmoorjani@ci.beaumont.ca.us

California Regional Water Quality Control Board
Santa Ana Region

Linda S. Adams
Secretary for
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Arnold Schwarzenegger
Governor

August 22, 2008

Mr. J. Andrew Schlange
General Manager
San Timoteo Watershed Management Authority
560 Magnolia Avenue
Beaumont, CA 92223

Mr. Deepak Moorjani
City Engineer
City of Beaumont
550 East 6th Street
Beaumont, CA 92223

MAXIMUM BENEFIT COMMITMENT STATUS

Dear Messrs. Schlange and Moorjani:

On January 15, 2008, I wrote to you to inquire about the progress that the San Timoteo Watershed Management Authority (STWMA) and the City of Beaumont (City) have made toward meeting the maximum benefit commitments as specified by the Basin Plan Amendment (Regional Board Resolution R8-2004-0001). On April 15, 2008, I sent you a follow-up letter requesting an update on the status of meeting the commitments. On April 30, 2008 you responded to my inquiry with a letter, which provided an update on the status of implementation of STWMA's and the City's commitments. In addition, by a letter dated April 15, 2008, your consultant, Wildermuth Environmental, Inc. (WEI), submitted the 2007 Annual Report for the Maximum Benefit Monitoring Program. My staff have reviewed both of the submittals and have determined that STWMA and the City have met most of the maximum benefit commitments. However, as discussed below, STWMA and the City have not satisfactorily completed the following two tasks: 1) Ambient Groundwater Quality Determination; and 2) Remove/Reduce the Discharge of City's Effluent from the Unlined Portion of San Timoteo Creek. This places STWMA's and the City's maximum benefit program in jeopardy. As you know, the failure to implement maximum benefit commitments will result in significant water quality and regulatory consequences, so it is imperative that these commitments be addressed immediately. Specifically, STWMA and the City must take action to address the following:

1) Beginning in 2005 and every three years thereafter, STWMA and the City are required to recalculate the ambient groundwater quality for the Beaumont and San Timoteo Groundwater Management Zones[1]. The recalculation was conducted by WEI for the

[1] In addition to STWMA and City, responsibility for recalculation of ambient groundwater quality for the San Timoteo Management Zone also rests with the Yucaipa Valley Water District pursuant to their maximum benefit implementation program.

Beaumont Management Zone in 2005 and in 2008. However, the re-calculation was not performed for the San Timoteo Management Zone in either year due to insufficient data. This issue was raised at N-TDS/Basin Monitoring Task Force meetings. A review of the above–referenced 2007 Annual Report and the recalculation reports confirms that water quality data, and monitoring wells necessary to provide these data, are inadequate in the San Timoteo Management Zone.

In order to continue to operate under the maximum benefit program, including waste discharge limitations based on the maximum benefit objectives, STWMA and City are hereby required to develop a workplan and schedule for the installation of monitoring wells in the San Timoteo Management Zone that will provide adequate data for calculation of the ambient groundwater water quality. This workplan and schedule must be submitted to the Regional Board Executive Officer for approval by October 31, 2008 and is to be implemented upon the Executive Officer's approval. Regional Board staff will evaluate the proposed workplan to ensure that proposed monitoring well locations are adequately spaced within the San Timoteo Management Zone. Our expectation is that the proposed schedule for this effort will result in completion of the well installation program as soon as possible. In short, the proposed workplan and schedule must be well justified.

2) STWMA's and the City's maximum benefit implementation plan specifies that by June 23, 2005, STWMA and the City are to develop a plan and schedule to remove/reduce the discharge of effluent to the unlined portion of San Timoteo Creek. Your April 30, 2008 letter indicates that STWMA and the City plan to leave 1.8 mgd of recycled water in Coopers Creek, a tributary to San Timoteo Creek, by 2010. We understand that this amount of continuing recycled water discharge was required by the State Water Resources Control Board and US Fish and Wildlife Service to protect beneficial uses and support the riparian resources developed downstream of the discharge point. The current (2008) discharge of recycled water is 3.0 mgd. It is not clear how STWMA and the City will accomplish the reduction to 1.8 mgd. Further, you need to provide recent modeling analysis to evaluate the impact of the continuing recycled water discharge on water quality in the San Timoteo Groundwater Management Zone. We believe that wasteload allocation analyses conducted by WEI in 2003 assumed a recycled water discharge of 2.3 mgd to the Creek by the City of Beaumont, and that no adverse impacts on the San Timoteo Groundwater Management Zone were identified. This analysis should be updated based on current knowledge and assumptions. The updated wasteload allocation analysis being conducted by WEI for discharges to the Santa Ana River system as a whole may suffice for the analysis of the effects of the 1.8 mgd discharge by the City, since a higher rate (3.0 mgd), is being assumed in the WEI analysis. Please provide the engineering plan for reduction of recycled water to Coopers Creek, and the modeling analysis to evaluate the impact of the continuing recycled water discharge on the water quality of the San Timoteo Groundwater Management Zone, by October 31, 2008.

Finally, since most of the monitoring required of STWMA and the City overlaps with that being conducted by Yucaipa Valley Water District as part of their maximum benefit program, we request that the annual report prepared and submitted on behalf of STWMA and the City by your consultant be combined with the report for Yucaipa Valley Water District. We believe it is more appropriate and useful to present and summarize the data for each management zone, rather than for each agency. For your information, we have made this request known to the Yucaipa Valley Water District.

A similar concern with respect to implementation of maximum benefit commitments exists for Chino Basin Watermaster (Watermaster)/Inland Empire Utilities Agency (IEUA). To address the Watermaster/IEUA issues, I have scheduled an item at the September 5, 2008 Regional Board meeting for the Watermaster/IEUA to provide information to the Board on the status of their maximum benefit commitments. I may also schedule a similar presentation at a future Regional Board meeting to review the status of STWMA's and City's maximum benefit status, including the option of scheduling a hearing to consider whether the application of the maximum benefit objectives continues to be appropriate.

If you have any questions about the requirements, please contact me or my staff, Hope Smythe, Senior Environmental Scientist, at (951) 782-4493, hsmythe@waterboards.ca.gov, or Cindy Li, Engineering Geologist, at (951) 782-4906, cli@waterboards.ca.gov.

Sincerely,

Gerard J. Thibeault
Executive Officer

cc: Mark Wildermuth, Wildermuth Environmental, Inc.,
mwildermuth@wildermuthenvironmental.com
Joe Zoba, Yucaipa Valley Water District, jzoba@yvwd.dst.ca.us
Mark Norton, Santa Ana Watershed Project Authority, mnorton@sawpa.org

Appendix B

Well Logs of Selected Wells in the STMZ

Project: Riverside Badlands Tunnel Segment	Log of Boring BH-19
Location: Riverside and San Bernardino Counties, CA	Sheet 1 of 10

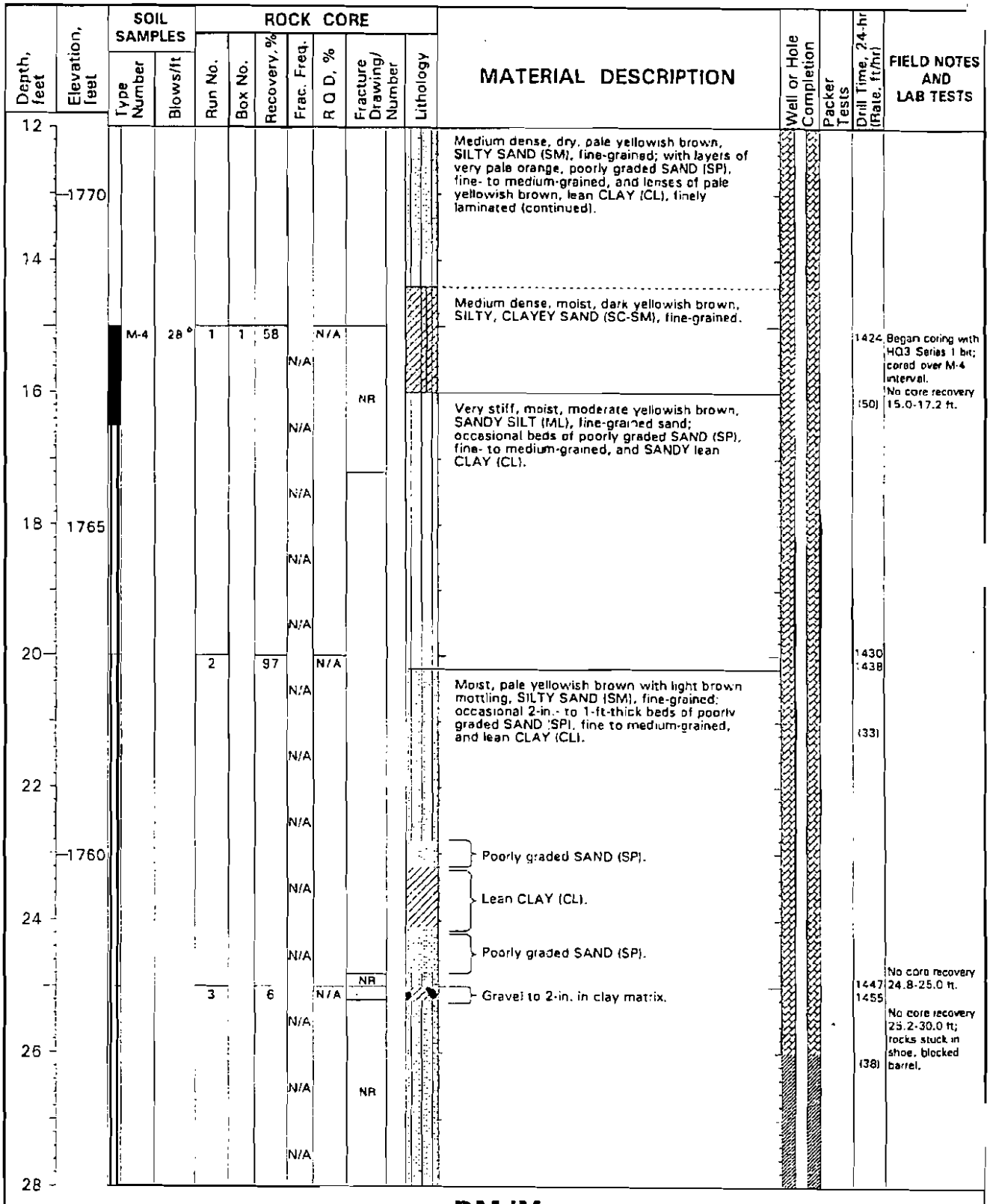
Date(s) Drilled	9/28/94 - 9/30/94	Logged By	M. Siem	Checked By	D. Streiff
Drilling Method	Hollow-stem auger 0-15 ft; wireline core 16-155 ft	Drill Bit Size/Type	10-in. Pengo drag bit; 3.78-in. Longyear HQ3 Series 1	Total Depth Drilled (feet)	155.0
Drill Rig Type	CME 75	Drilled By	Tri-County Drilling	Inclination from Horizontal/Bearing	90°
Groundwater Level and Date Measured	44.6 ft bgs on 7/12/95	Coordinate Location	N 2302485 E 6295861	Surface Elevation (feet)	1783.0
Diameter of Hole (inches)	10; 3.78 Diameter of Well (inches) 4	Type of Well Casing	Schedule 40 PVC	Screen Perforation	0.020-inch
Type of Sand Pack	#3 Monterey sand	Type/Thickness of Seal(s)	Bentonite pellets 30-26 ft; bentonite-cement grout 26 ft to ground surface		
Comments	Alignment Sta 1334+11.14 W 28.41. Hole took approx. 20 gallons drilling fluid per 5-ft run from 55-155 ft.				

Depth, feet	Elevation, feet	SOIL SAMPLES Type Number	SOIL SAMPLES Blows/ft	ROCK CORE Run No.	ROCK CORE Box No.	ROCK CORE Recovery, %	ROCK CORE Frac. Freq.	ROCK CORE R Q D, %	ROCK CORE Fracture Drawing/ Number	ROCK CORE Lithology	MATERIAL DESCRIPTION	Well or Hole Completion	Packer Tests	Drill Time, 24-hr (Rate, ft/hr)	FIELD NOTES AND LAB TESTS
0		M-1	12 ◊								**ALLUVIUM** Medium stiff, dry, pale yellowish brown, SANDY SILT (ML), fine-grained sand with trace coarse-grained; carbonate-filled root casts and rootlets; some mottling.			1257	
2														(33)	
	1780														
4															
		M-2	25 ◊											1306	
6											Medium dense, dry, pale yellowish brown, SILTY SAND (SM), fine-grained.			(33)	
8	1775										With layers of very pale orange, poorly graded SAND (SP) and lenses of lean CLAY (CL).				
10		M-3	16 ◊								Very stiff, dry to moist, pale yellowish brown, lean CLAY (CL), trace silt. Medium dense, dry to moist, very pale orange, poorly graded SAND (SP), fine- to medium-grained. Very stiff, dry to moist, pale yellowish brown, lean CLAY (CL).			1315 (30)	
12															

◊ indicates IAC sampler blow count multiplied by 0.9 to correlate with SPT sampler blow count

Project: Riverside Badlands Tunnel Segment
Location: Riverside and San Bernardino Counties, CA

Log of Boring BH-19



Project: Riverside Badlands Tunnel Segment
Location: Riverside and San Bernardino Counties, CA

Log of Boring BH-19

Sheet 3 of 10

Depth, feet	Elevation, feet	SOIL SAMPLES Type Number	SOIL SAMPLES Blows/ft	ROCK CORE Run No.	ROCK CORE Box No.	ROCK CORE Recovery, %	ROCK CORE Frac. Freq.	ROCK CORE R Q D, %	ROCK CORE Fracture Drawing/ Number	Lithology	MATERIAL DESCRIPTION	Well or Hole Completion	Packer Tests	Drill Time, 24-hr (Rate, ft/hr)	FIELD NOTES AND LAB TESTS
28	1755						N/A		NR		Moist, pale yellowish brown with light brown mottling, SILTY SAND (SM), fine-grained; occasional 2-in.- to 1-ft-thick beds of poorly graded SAND (SP), fine to medium-grained, and lean CLAY (CL) (continued).				
							N/A								
30				4		20		N/A			Gravel to 1.5-in. (matrix washed out).			1503 1510	
							N/A				Moist, moderate brown, SANDY CLAYEY SILT to SANDY lean CLAY (ML/CL), fine-grained sand.				
32							N/A							(33)	No core recovery 31.0-35.0 ft.
							N/A		NR						
	1750										Moist, moderate brown, lean CLAY (CL), trace to some silt, trace fine-grained sand.				
34							N/A								
				5		16		N/A						1519 1534	
36							N/A								No core recovery 35.8-40.0 ft.
							N/A							(27)	
							N/A		NR						
38	1745						N/A								
							N/A								
40				6		100		N/A			Increasing silt and fine-grained sand content.			1545 1604	
							N/A				Interbedded moist, moderate brown, SILTY SAND (SM), fine- to medium-grained; poorly graded SAND with SILT (SP-SM); and poorly graded SAND (SP), medium-grained.			(50)	
42							N/A								
				7		68	N/A	N/A			Fat CLAY (CH).			1607 1618	
	1740										Moist, light olive brown, elastic SILT (MH).				
44							N/A							(25)	

Project: Riverside Badlands Tunnel Segment
Location: Riverside and San Bernardino Counties, CA

Log of Boring BH-19

Depth, feet	Elevation, feet	SOIL SAMPLES Type Number	SOIL SAMPLES Blows/ft	ROCK CORE Run No.	ROCK CORE Box No.	ROCK CORE Recovery, %	ROCK CORE Frac. Freq.	ROCK CORE R Q D, %	ROCK CORE Fracture Drawing/ Number	Lithology	MATERIAL DESCRIPTION	Well or Hole Completion	Packer Tests	Drill Time, 24-hr (Rate, ft/hr)	FIELD NOTES AND LAB TESTS
44							N/A		NR		Moist, light olive brown, elastic SILT (MH) (continued).				No core recovery 44.1-45.0 ft.
				8		46		N/A						1624	End drilling for 9/28/94.
							N/A							0733	Resumed drilling on 9/29/94.
46											Moist, light to moderate brown, SILTY SAND (SM), fine- to medium-grained.			(50)	
							N/A								
							N/A								No core recovery 47.3-50.0 ft.
48	1735						N/A		NR						
							N/A								
50				9		80		N/A						0739	
							N/A							0746	
														(33)	
							N/A				Interbedded moist, yellowish gray to dusky yellow, poorly graded SAND (SP), coarse-grained, and SILTY SAND (SM), fine- to medium-grained.				
52					2		N/A								
	1730														At 53.0 ft: SA(19) WC = 1
							N/A								
54															No core recovery 54.0-55.0 ft.
							N/A		NR						
				10		26		N/A			With trace (<1%) gravel to 2 in.			0755	
							N/A							0759	
											Becomes black.				
56											Increasing gravel content to <5%.			(43)	
							N/A								No core recovery 56.3-60.0 ft; matrix washing out, only gravel recovered.
							N/A								
58	1725								NR						
							N/A								
							N/A								
60														0806	

Project: Riverside Badlands Tunnel Segment
Location: Riverside and San Bernardino Counties, CA

Log of Boring BH-19

Sheet 5 of 10

Depth, feet	Elevation, feet	SOIL SAMPLES Type Number	SOIL SAMPLES Blows/ft	ROCK CORE Run No.	ROCK CORE Box No.	ROCK CORE Recovery, %	ROCK CORE Frac. Freq.	ROCK CORE R Q D, %	ROCK CORE Fracture Drawing/ Number	Lithology	MATERIAL DESCRIPTION	Well or Hole Completion	Packer Tests	Drill Time, 24-hr (Rate, ft/hr)	FIELD NOTES AND LAB TESTS
60				11		16	N/A	N/A			GRAVEL (matrix washed out), fine to coarse (to 2 in., predominantly 0.75 in.).			0811	
							N/A								No core recovery 60.6-65.0 ft.
														(30)	
62							N/A								
							N/A		NR						Hole has been taking ~20 gal. per 5-ft run.
	1720														
							N/A								
64															
							N/A								
				12		20		N/A						0821	
							N/A							0826	
66											Moist, light olive, poorly graded SAND with SILT (SP-SM), fine-grained.				
							N/A							(38)	No core recovery 66.0-70.0 ft.
68	1715						N/A		NR						
							N/A								
70				13		24		N/A						0834	
							N/A				Pebbles and cobbles; granodiorite/diorite porphyry; cobble > 5 in.			0840	Possibly basal gravel unit.
														(27)	
							N/A								No core recovery 71.2-75.0 ft.
72															
							N/A								
	1710								NR						
							N/A								
74															Lab Sample #5 75.2-75.6 ft: LL = 53, PI = 30 SLAKE Id = 0.1 DUW = 89 WC = 35 XRD
							N/A				OLDER ALLUVIUM(?) Soft, moist, olive gray, fat CLAY (CH); laminated.				
				14		96		N/A						0851	
							N/A							0857	(sample under minimum mass required by ASTM D2487-93): SA(97)
76															

Project: Riverside Badlands Tunnel Segment
Location: Riverside and San Bernardino Counties, CA

Log of Boring BH-19

Depth, feet	Elevation, feet	SOIL SAMPLES Type Number	SOIL SAMPLES Blows/ft	ROCK CORE Run No.	Box No.	Recovery, %	Frac. Freq.	R Q D, %	Fracture Drawing/ Number	Lithology	MATERIAL DESCRIPTION	Well or Hole Completion	Packer Tests	Drill Time, 24-hr (Rate, ft/hr)	FIELD NOTES AND LAB TESTS
76							N/A				Soft, moist, olive gray, fat CLAY (CH); laminated (continued).			(14)	
											Moist, light olive gray, SILTY SAND with GRAVEL (SM), ~15% gravel typically ~0.75 in.; interbedded with olive gray to light olive gray, poorly graded SAND with SILT (SP-SM), fine- to medium-grained, and lean CLAY (CL).			0908	
78	1705			15		0	N/A	N/A						0916	No core recovery 77.5-80.0 ft.
							N/A		NR					(38)	
							N/A								
80				16		48		N/A						0920	
							N/A							0925	
														(38)	Lab Sample #6 80.8-81.2 ft SA(8) WC = 23
82							N/A		NR						
														0929	No core recovery 81.2-82.5 ft.
	1700			17		28	N/A	N/A						0936	
							N/A								No core recovery 83.2-85.0 ft.
84									NR					(21)	
							N/A								
				18		92		N/A						0943	
							N/A				Moist, pale olive, SILT (ML) and lean CLAY (CL); finely laminated and interbedded; trace black organics.			0948	
86														(30)	
							N/A								Lab Sample #7 86.9-87.3 ft.
									NR					0953	No core recovery
				19		52	N/A	N/A						0959	87.3-87.5 ft.
88	1695						N/A				Moist, pale olive, SILTY SAND (SM), fine- to medium-grained; 1- to 2-in.-thick interbeds of CLAYEY SAND (SC) and gravel.			(15)	
									NR						No core recovery 88.8-90.0 ft.
							N/A								
90				20		28		N/A						1009	
							N/A							1012	
									NR					(30)	No core recover 90.7-92.5 ft.
							N/A								
92															

Printed 5/25/96; Log Revised 10/15/95

DMJM
Woodward-Clyde Consultants

Prj ID: IFBAD; Template: ICOS

Project: Riverside Badlands Tunnel Segment
Location: Riverside and San Bernardino Counties, CA

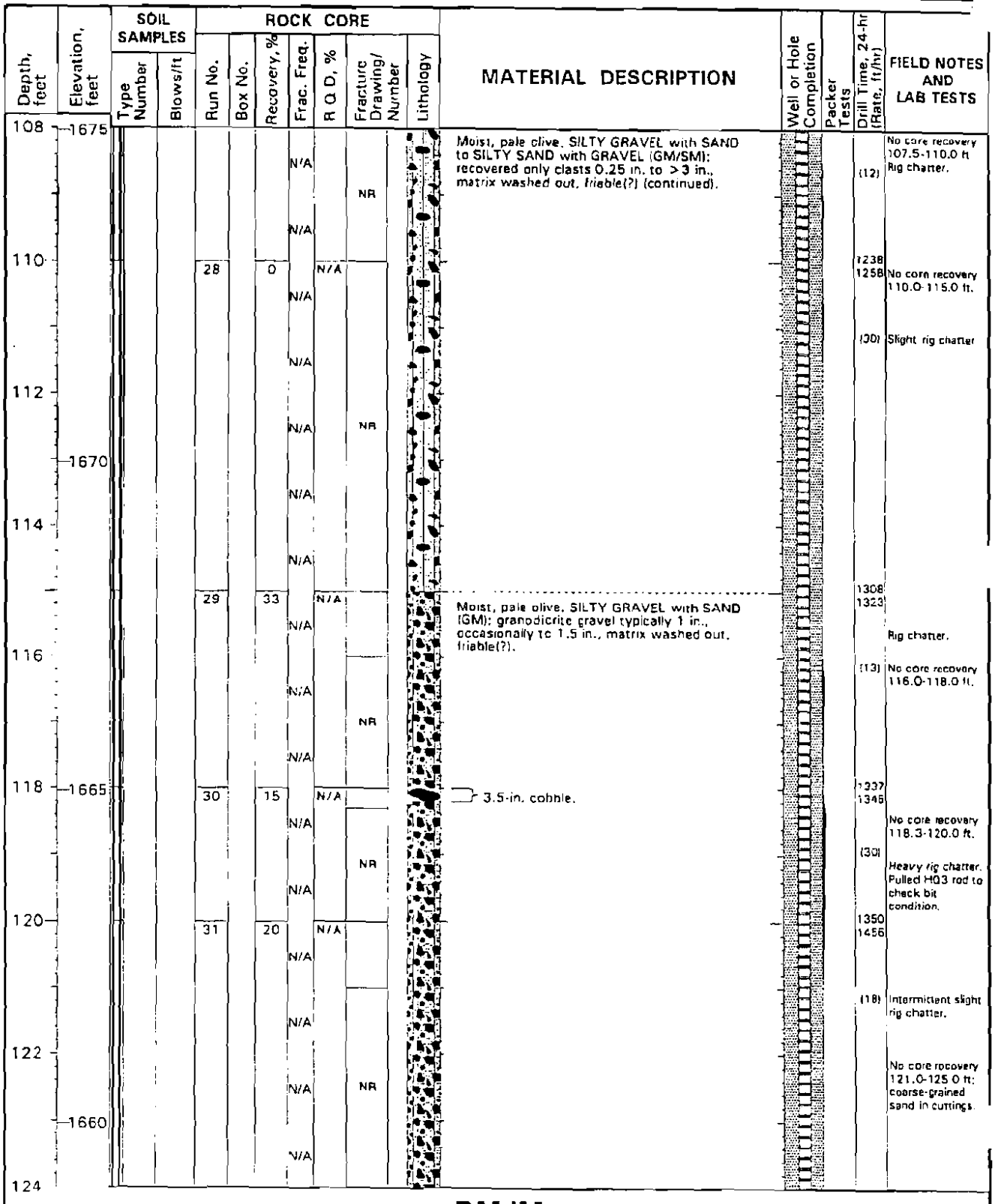
Log of Boring BH-19

Sheet 7 of 10

Depth, feet	Elevation, feet	SOIL SAMPLES Type Number	SOIL SAMPLES Blows/ft	ROCK CORE Run No.	Box No.	Recovery, %	Frac. Freq.	R Q D, %	Fracture Drawing/ Number	Lithology	MATERIAL DESCRIPTION	Well or Hole Completion	Packer Tests	Drill Time, 24-hr (Rate, ft/hr)	FIELD NOTES AND LAB TESTS
92									NR		Moist, olive gray, SANDY SILT (ML) and SANDY lean CLAY (CL); fine-grained sand, finely laminated, interbedded.			1017	
				21		16	N/A	N/A						1022	No core recovery 92.9-95.0 ft.
	1690														
94							N/A		NR					(25)	
							N/A								
	INVERT			22		16		N/A						1028	
							N/A							1041	Lab Sample #8 95.0-95.4 ft. SA/HD(80) WC = 34
96											Moist, olive gray, SILT with SAND (ML); interbeds of poorly graded SAND with GRAVEL (SP), medium- to coarse-grained.				
							N/A		NR					(25)	No core recovery 95.4-115.0 ft; only cuttings are few coarse sand grains.
				23		0	N/A	N/A						1047	
98	1685													1051	No core recovery 97.5-100.0 ft.
							N/A		NR					(30)	
							N/A								
100				24		0		N/A						1056	
							N/A							1105	No core recovery 100.0-102.5 ft.
									NR					(30)	
102							N/A								
				25		0	N/A	N/A						1110	
	1680													1120	No core recovery 102.5-105.0 ft.
							N/A		NR					(25)	
104															
							N/A								
				26		0		N/A						1126	
							N/A							1155	Changed 5-ft-long drill rod for 10-ft.
106									NR						No core recovery 105.0-107.5 ft.
							N/A							(14)	Changed latch on inner barrel.
											Moist, pale olive, SILTY GRAVEL with SAND to SILTY SAND with GRAVEL (GM/SM); recovered only clasts 0.25 in. to >3 in., matrix washed out, friable(?).			1206	
				27		0	N/A	N/A	NR					1225	No core recovery 107.5-110.0 ft
108															

Project: Riverside Badlands Tunnel Segment
Location: Riverside and San Bernardino Counties, CA

Log of Boring BH-19



Project: Riverside Badlands Tunnel Segment
Location: Riverside and San Bernardino Counties, CA

Log of Boring BH-19

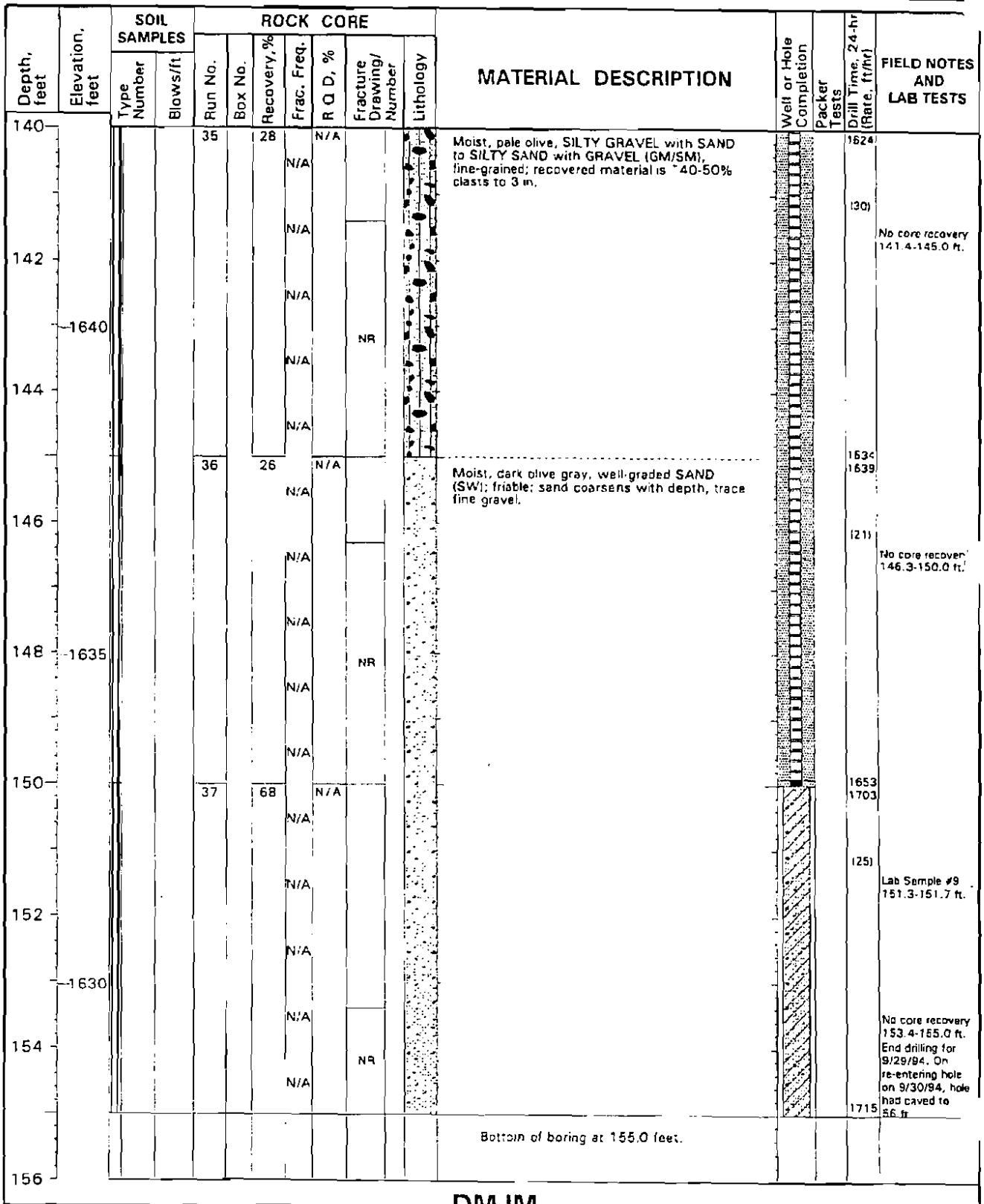
Depth, feet	Elevation, feet	SOIL SAMPLES Type Number	SOIL SAMPLES Blows/ft	ROCK CORE Run No.	Box No.	Recovery, %	Frac. Freq.	R Q D, %	Fracture Drawing/ Number	Lithology	MATERIAL DESCRIPTION	Well or Hole Completion	Packer Tests	Drill Time, 24-hr (Rate, ft/hr)	FIELD NOTES AND LAB TESTS
124							N/A		NR		Moist, pale olive, SILTY GRAVEL with SAND (GM); granodiorite gravel typically 1 in., occasionally to 1.5 in., matrix washed out, friable(?) (continued).				
				32	3	30		N/A						1513 1525	
126							N/A								
							N/A							(23)	Rig chatter.
							N/A								No core recovery 126.5-130.0 ft.
128	1655						N/A		NR						
							N/A								
130				33		26		N/A						1538 1541	
							N/A								
							N/A							(14)	Slight rig chatter.
132															No core recovery 131.3-135.0 ft.
	1650						N/A		NR						
							N/A								
134							N/A								
				34		0		N/A						1603 1612	No core recovery 135.0-140.0 ft.
136							N/A								
							N/A							(50)	Decreased rig chatter; faster drilling.
							N/A		NR						
138	1645						N/A								
							N/A								
140														1618	

Project: Riverside Badlands Tunnel Segment

Location: Riverside and San Bernardino Counties, CA

Log of Boring BH-19

Sheet 10 of 10



Project Name:	**STWMA PC-1**	**Boring Log / H-1**	
Project Location:	**Beaumont, California**		
Project Number:	**050-003-001**	Sheet 1 of 18	
Client:	**BCVWD/STWMA**		

Date Started	**8/10/06**	Date Finished	**8/16/06**	Borehole Depth	**818.0 feet**	Drilling Contractor	**Best Drilling**
Lat.	**33° 56' 11"**	Long.	**117° 2' 4"**	Drill Bit Size/Type	**24-inch Tri-cone**	Driller	**Mike Kennedy**
Ground Surface Elevation	**2295.0 feet**			Screened Interval(s)	**160-360, 390-540**	Drill Rig Type	**Failing Jed-A**
Top of Casing Elevation	**2295.0 feet**			Depth to Groundwater	**6'/08-10-06**	Drilling Method	**Flooded Reverse Circulation**
Logged By	**T.Rolfe**			Reviewed By	**B. Leever, PG, CHG**	Sampling Method	**Grab**

Elevation, feet-msl	Depth, feet-bgs	Sample Interval	Drill Time [Rate, feet/min.]	Graphic Log	MATERIAL DESCRIPTION	WELL SCHEMATIC AND CONSTRUCTION DETAILS	FIELD NOTES
	0				Top Soil: dark yellowish brown (10YR,3/4), medium sand (5%), trace mica, 70% fine sand, 25%silt, twigs present, moist		
2290	5						
					Sandy Silt (ML): (10YR,4/4) dark yellowish brown sand (15%), silt (90%), fine sand (15%)		
	10						
					CLAY (CL): dark yellowish brown (10YR,3/6)		
2280	15				(10YR,4/6) 10% fine sand, trace medium sand, saturated with water	36" nominal dia. borehole with 30" diamter steel conductor casing with 5/16" thick walls. Cement sanitary seal (0-50 feet-below ground surface)	
	20				yellowish brown(10YR,5/4), mica's present 25% fine sand, 5% medium sand		
					Sandy SILT(ML): light yellowish brown (10YR,6/4), interbedded layer of clay		
2270	25				light reddish brown (5YR,6/4), light reddish brown, interbedded clay	Cement Seal	
					dark yellow brown (10YR,4/6), trace course sand, 5% medium sand, 40% fine sand, 7" diameter clay nodule present		
	30						
					Sandy CLAY (CL): light yellowish brown (10YR,6/4), 30% fine sand, 10% medium sand. Interbedded red streaks seen, dry inside of some consolidated sandstone, well lithified		
2260	35						
					CLAY (CL): yellowish brown (10YR,5/8), 20% fine sand, 10% medium-coarse sand		
	40				SAND (SP): bluish grey (Gley 2,6/1), semi-consolidated sands.		

WILDERMUTH ENVIRONMENTAL INC

Report WELL LOG, File: HEARTLAND WELL 1.GPJ; 11/29/2006

Project Name:	**STWMA PC-1**
Project Location:	**Beaumont, California**
Project Number:	**050-003-001**
Client:	**BCVWD/STWMA**

Boring Log / H-1

Elevation, feet-msl	Depth, feet-bgs	Sample Interval	Drill Time [Rate, feet/min.]	Graphic Log	MATERIAL DESCRIPTION	WELL SCHEMATIC AND CONSTRUCTION DETAILS	FIELD NOTES
	40				Mica;s, quartz and plagioclase present		
					Clayey SAND (SW): light olive brown (2.5YR,5/6)		
					Clayey SAND (SW): yellowish brown (10YR,5/8), gravel		
	45					Cement Seal	
					Clay with SAND (CL): dark yellowish brown (10YR,4/6), medium gravel present, angular to sub-angular		
2240							
	50				CLAY (CL): light olive brown (2.5Y,5/4), interbedded with fine sandstone and gravel clasts.		
					Silty CLAY (ML): yellowish brown (10YR,5/4), fine, poorly graded sand	No. 60 transition sand (50'-55' bgs)	
					CLAY (CH): light olive brown (2.5Y,5/4)		
					CLAY (CH): clay with sand	24" nominal dia. borehole (50-560ft)	
	55						
					Clayey SAND (SC): light olive brown (2.5Y,5/4)		
2230					Gravelly CLAY (GC): yellowish brown (10YR,5/4), medium sand, fine gravel		
	60				Sandy CLAY (SC): light olive brown (2.5Y,5/4), fine to medium sand		
					SAND (SW): light yellowish brown (2.5Y,6/4), 70% fine sand, 20% medium sand, 10% coarse sand		
	65				light brown (7.5YR,6/4), 15% fine sand, 25% medium sand, 20% coarse sand, quartz, feldspar with gravel, sub-angular to sub-rounded.	**H-1**: 12-1/4" dia. copper bearing casing (with louvered screen from 160-360; 390-540 ft-bgs)	
2220							
	70				CLAY (CL): light olive brown (2.5Y,5/6)		
					Sand with GRAVEL (SW): light grey (10YR,7/1)		
	75					8x16 Tacna sand	
2210							
	80				Clay with SAND (CH): light olive brown (2.5Y,5/6)		
	85				Clay with Gravel and SAND (CH): olive (5Y,5/4) subrounded minerals (quartz & feldspar) and granite clasts		

WILDERMUTH ENVIRONMENTAL INC

Report WELL LOG; File HEARTLAND WELL 1.GPJ; 11/29/2006

Project Name:	**STWMA PC-1**
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Project Number:	**050-003-001**
Client:	**BCVWD/STWMA**

Boring Log / H-1

Elevation, feet-msl	Depth, feet-bgs	Sample Interval	Drill Time [Rate, feet/min.]	Graphic Log	MATERIAL DESCRIPTION	WELL SCHEMATIC AND CONSTRUCTION DETAILS	FIELD NOTES
2200	90				SAND (SW): pale olive (5Y,6/3), 30% gravel, 20% sand, 40% medium sand, 10% fine sand		
	95				Sandy CLAY (CH): olive (5Y,5/4), medium to coarse sand		
2190	100				SAND (SW): pale brown (10YR,6/3), 70% medium sand, 20% coarse sand, 10% fine sand, trace gravel		
	105				Clay with Gravel and SAND (CH): light olive brown (2.5Y,5/4), sub-rounded clasts (2mm-2") in size		
2180	110				Clayey GRAVEL (CG): light yellowish brown (2.5Y,6/4), sub rounded granite	8x16 Tacna sand	
	115				Clayey GRAVEL (CH): light olive brown (2.5Y,5/3), sub-rounded clasts		
2170	120				SAND (SW): light brownish grey (2.5Y,6/2), gravel is sub-angular to sub-rounded, sand is fine to coarse		
	125				CLAY (CH): light olive brown (2.5Y,5/4), trace fine gravel, well rounded		
2160	130				CLAY with SAND (CH): light olive brown (2.5Y,5/4), sub-angular sand (med-coarse)		
					SAND (SW): light grey (10YR,7/2), 15% coarse sand, 65% medium sand, 15% fine sand, 5% fine gravel. Epidote present, interbedded clay and sand lenses		

Report WELL LOG; File: HEARTLAND WELL 1.GPJ; 11/29/2006

WILDERMUTH ENVIRONMENTAL INC

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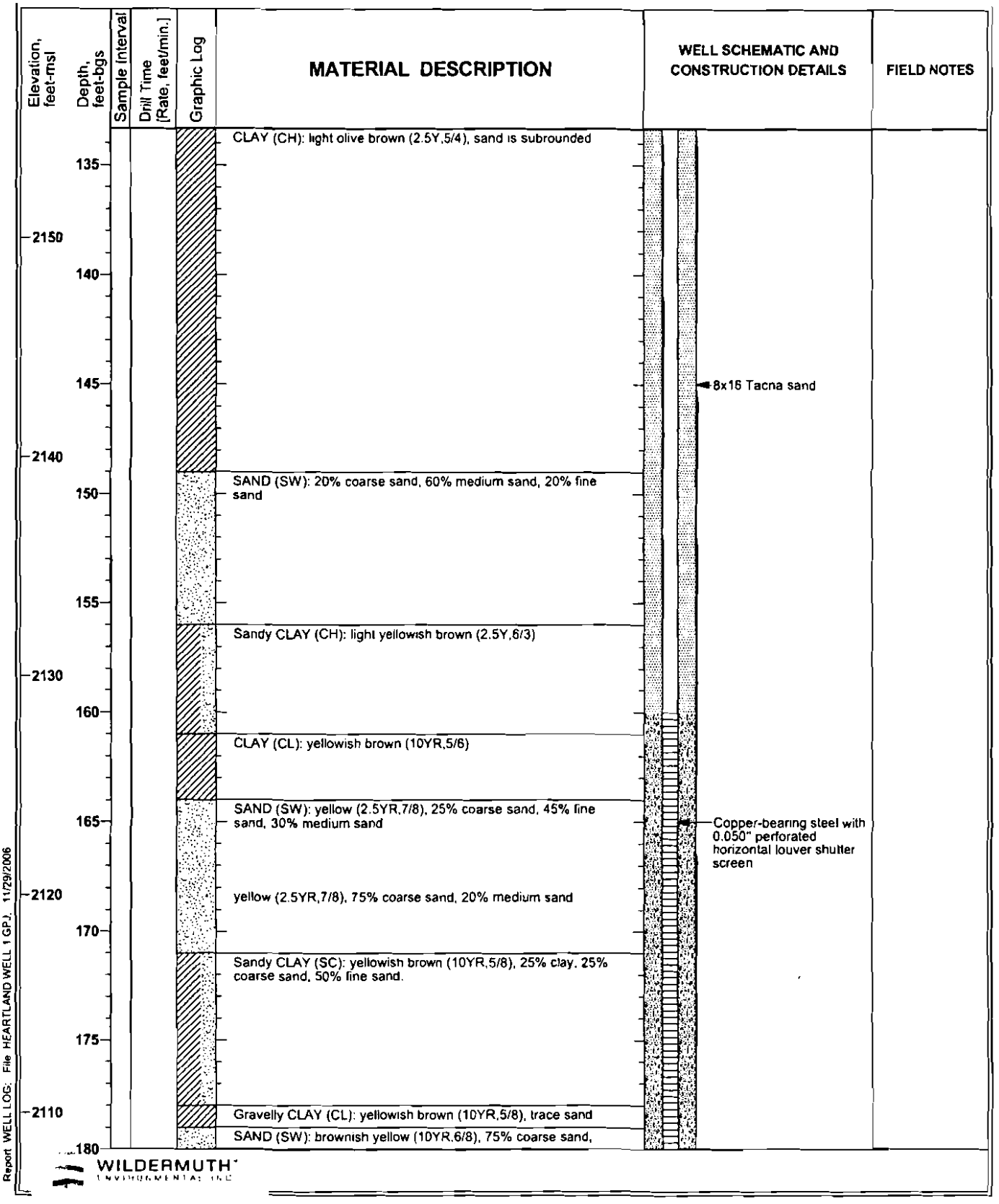
Client:	**BCVWD/STWMA**

Boring Log / H-1



Report WELL LOG; File HEARTLAND WELL 1.GPJ; 11/29/2006

WILDERMUTH ENVIRONMENTAL INC

Project Name:	**STWMA PC-1**
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Boring Log / H-1

Elevation, feet-msl	Depth, feet-bgs	Sample Interval	Drill Time [Rate, feet/min.]	Graphic Log	MATERIAL DESCRIPTION	WELL SCHEMATIC AND CONSTRUCTION DETAILS	FIELD NOTES
	180				sub-angular to angular, 15% fine sand, trace gravel, 5% clay		
					CLAY (CH): very pale brown (10YR,7/4), 5% coarse sand, 5% medium sand		
	185				olive (5Y,5/4)		
					olive (5Y,5/4), coarse sand		
2100							
	190				Sandy CLAY (SC): olive grey (5YR,4/2), 25% fine sand, 25% medium sand		
					pale yellow (10YR,7/4), 30% fine sand		
					yellowish brown (10YR,5/4), coarse sand		
	195				light olive brown (2.5YR,5/4), coarse sand, trace gravel	8x16 Tacna sand	
					yellow (10YR,7/8), trace gravel		
2090					yellowish brown (10YR,5/4), trace medium sand		
	200				yellowish brown (10YR,5/6), 5% medium to coarse sand, angular to subangular	Copper-bearing steel with 0.050" perforated horizontal louver shutter screen	
					olive (5Y,5/4), trace medium sand		
	205				very dark grayish brown (2.5YR,3/2), medium to coarse sand, trace gravel		
					very dark grayish brown (2.5YR,3/2), medium sand		
2080							
	210				olive brown (2.5YR,3/2), 10% medium sand		
					light yellowish brown (10YR,6/4), fine sand		
	215				light yellowish brown (10YR,6/4), fine sand		
					light olive brown (2.5YR,5/4), fine sand		
2070					light brownish grey (2.5Y,6/2), fine sand		
	220				yellowish brown (2.5Y,6/2), fine to medium sand		
					yellowish brown (10YR,5/8), fine sand		
	225				olive brown (2.5Y,4/3), some fine sand		

WILDERMUTH ENVIRONMENTAL INC

Report WELL LOG, File: HEARTLAND WELL 1.GPJ; 11/29/2006

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Project Number:	**050-003-001**
Client:	**BCVWD/STWMA**

Boring Log / H-1

Elevation, feet-msl	Depth, feet-bgs	Sample Interval	Drill Time [Rate, feet/min]	Graphic Log	MATERIAL DESCRIPTION	WELL SCHEMATIC AND CONSTRUCTION DETAILS	FIELD NOTES
2060	230				olive brown (2.5Y,4/3), fine to medium sand		
					yellowish brown (10YR,6/8)		
	235				yellow (10YR,7/6), fine to medium sand	8x16 Tacna sand	
					yellowish brown (10YR,5/6), medium to fine sand		
2050	240				SAND (SW): olive brown (2.5Y,4/4), 90% medium sand, 6% coarse sand		
					olive brown (2.5Y,8/4), 95% medium sand, 4% coarse sand		
					Clayey SAND (SC): olive (5Y,5/4) 50-60% medium to coarse sand, trace grevel		
	245				SAND (SW): olive (5Y,4/3), 70% medium sand, 20% fine sand, 10% coarse sand, trace gravel		
2040	250				light olive brown (2.5Y,5/4), 80-95% fine to coarse sand, trace gravel		
					olive (5Y,4/3), 55-60% medium sand, 30% fine sand. Gravel is sub-rounded-sub-angular.		
					light olive brown (2.5Y,5/4), 25% medium sand, 50% coarse sand. Gravel is sub-rounded, sub-angular		
	255				Clayey SAND (SC): light olive brown (2.5Y,5/3), 60% coarse sand, 20% medium to fine sand, trace gravel	Copper-bearing steel with 0.050" perforated horizontal louver shutter screen(160-360ft)	
2030					Sandy CLAY (SC): pale brown (10YR,6/3), pale brown 20% fine to medium sand, 10% coarse sand, some gravel		
	260				CLAY (CL): pale brown (10YR,6/3), coarse sand, trace gravel		
					Sandy CLAY (SC): dark grey (5Y,4/1), medium to coarse sand, trace gravel		
	265				SAND (SW): dark grayish brown (2.5YR,4/2), 55% medium sand, 40% coarse sand, gravel is sub-rounded to angular		
2020							
	270				olive brown (2.5YR,4/4), 70% medium sand, 20% coarse sand, gravel is sub-rounded to angular		
					CLAY (CL): olive (5Y,4/4), coarse sand, some gravel (sub-rounded to sub-angular)		

WILDERMUTH ENVIRONMENTAL INC

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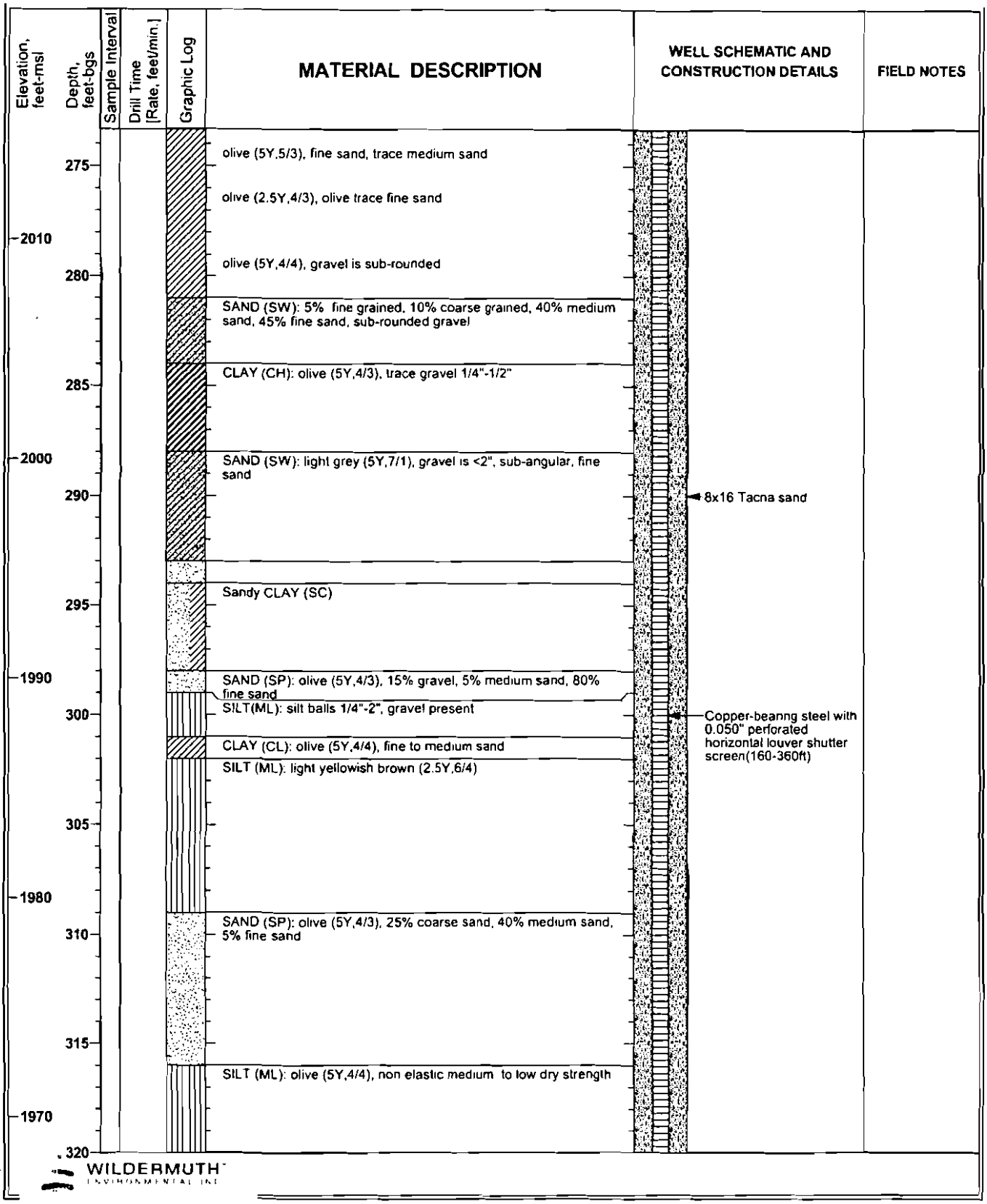
Boring Log / H-1



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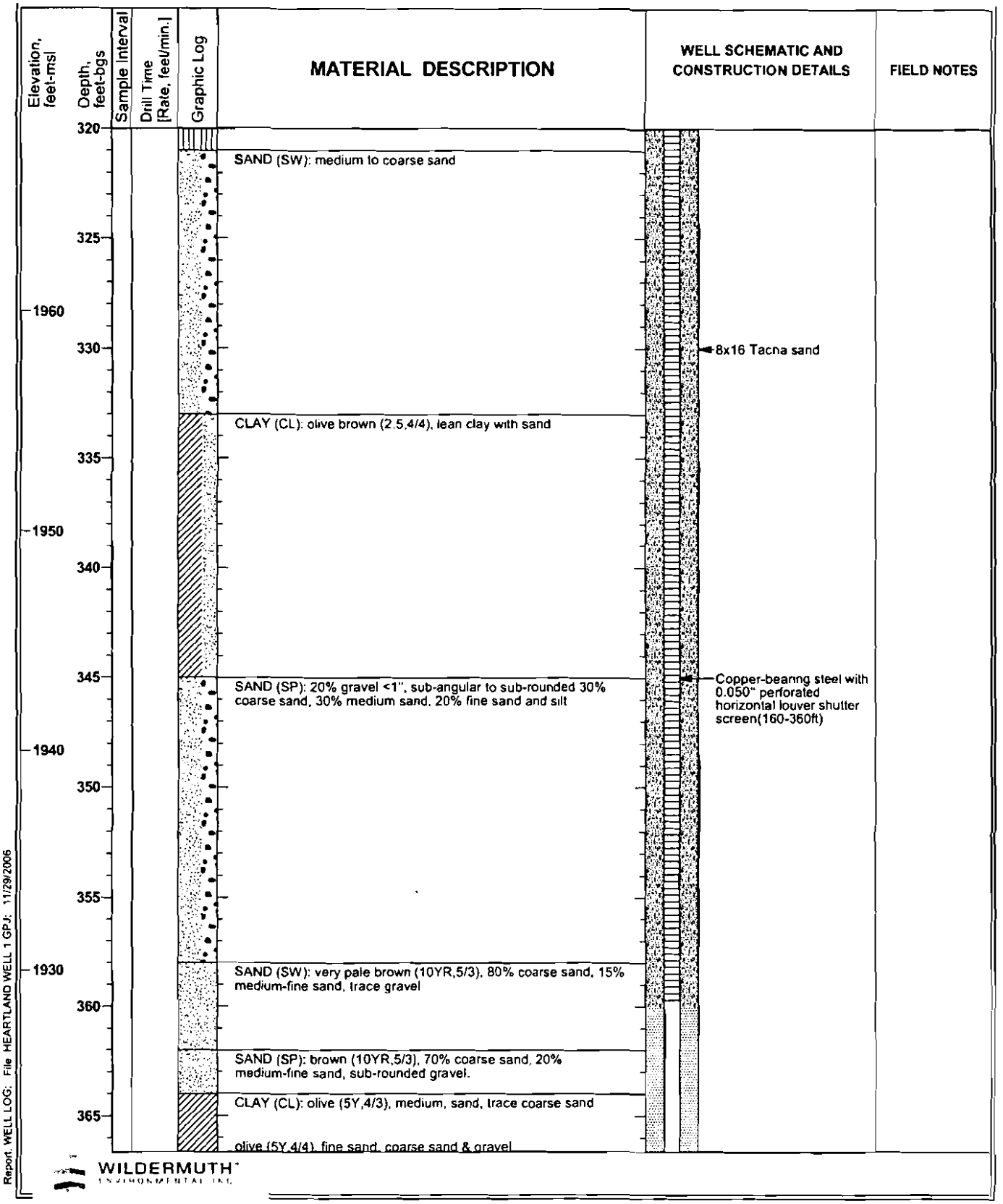
Boring Log / H-1



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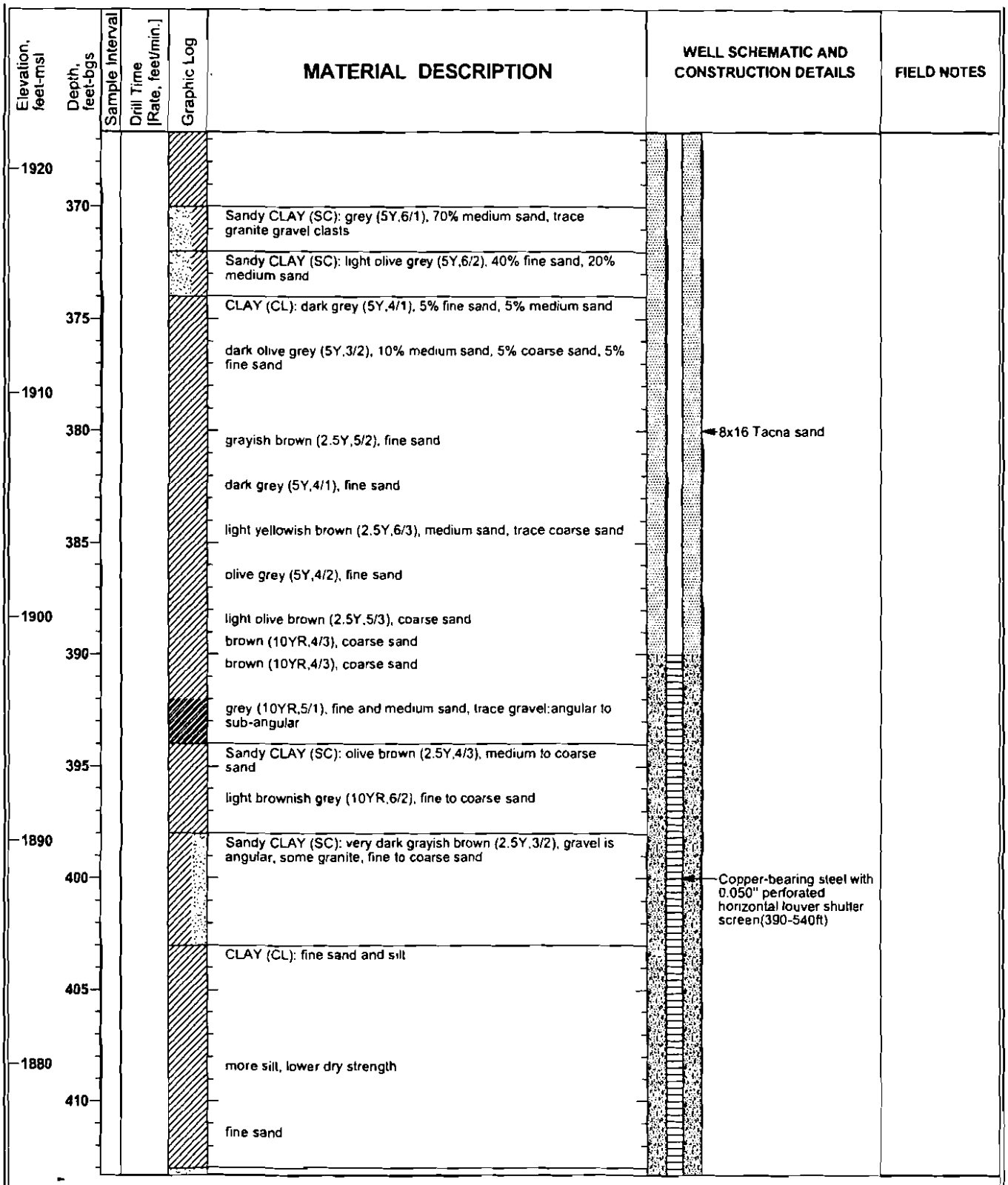
Boring Log / H-1



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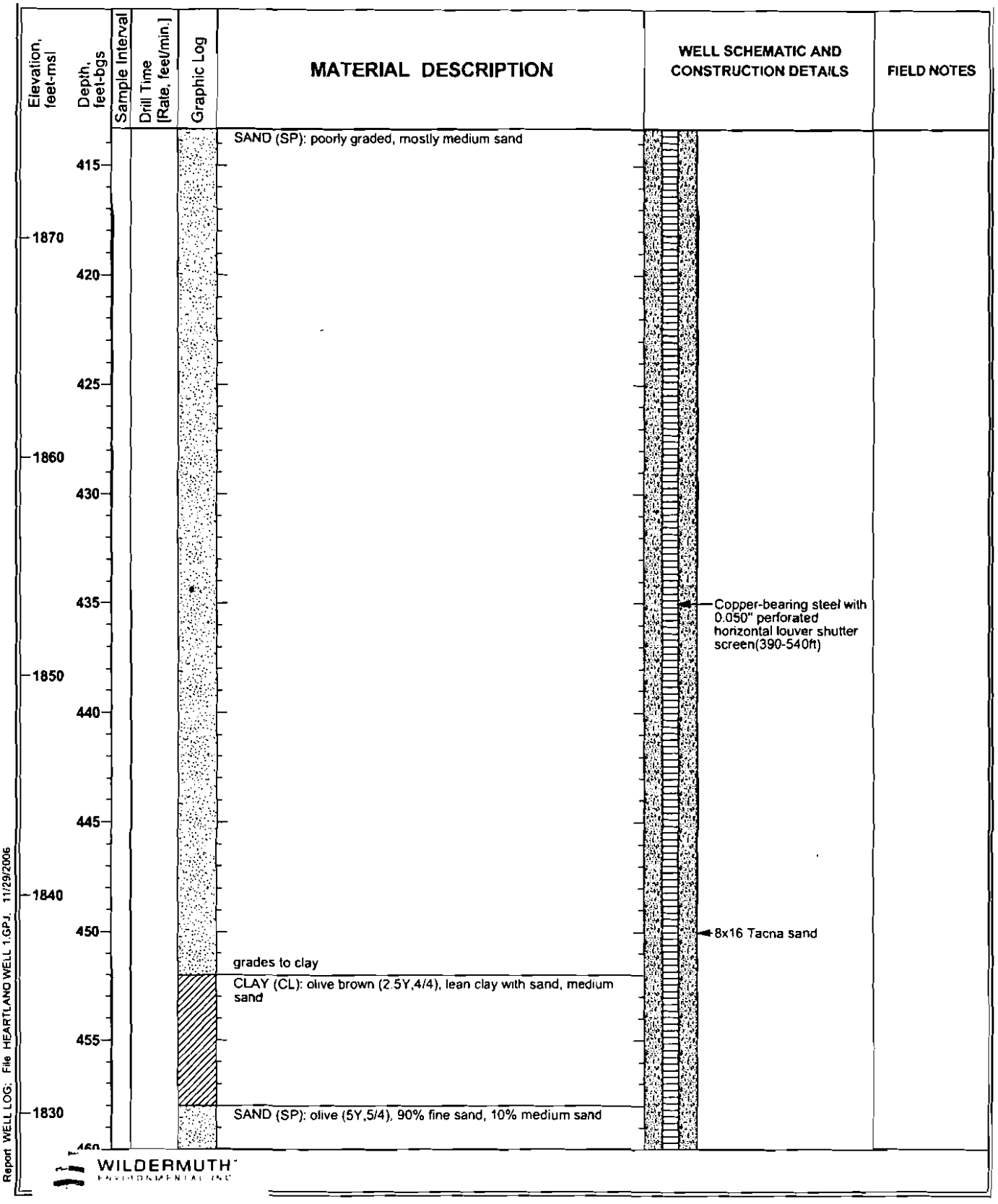
Boring Log / H-1



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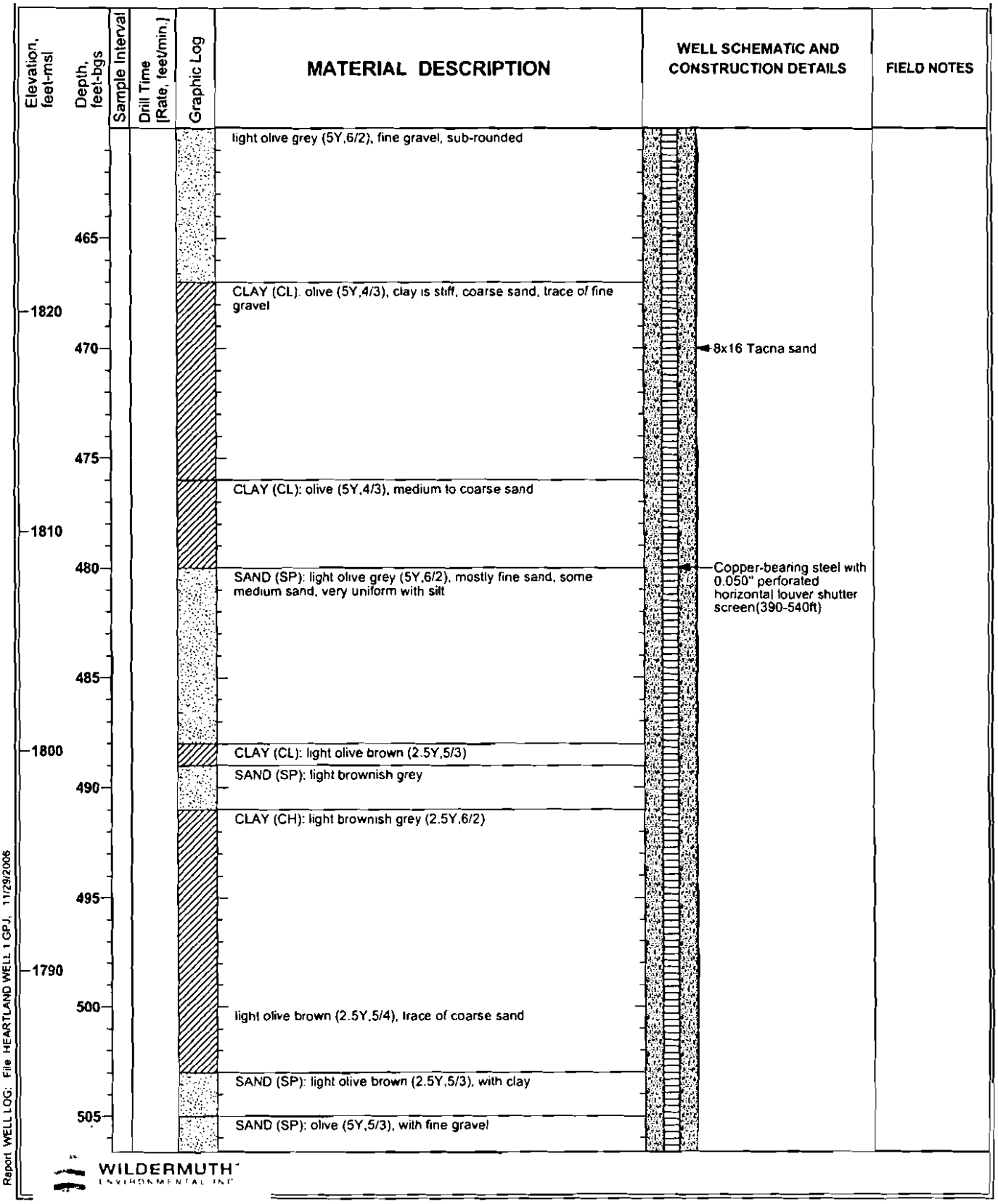
Boring Log / H-1



Report WELL LOG: File HEARTLAND WELL 1.GPJ, 11/29/2006

WILDERMUTH ENVIRONMENTAL INC.

Project Name:	**STWMA PC-1**
Project Location:	**Beaumont, California**
Project Number:	**050-003-001**
Client:	**BCVWD/STWMA**

Boring Log / H-1

Elevation, feet-msl	Depth, feet-bgs	Sample Interval	Drill Time [Rate, feet/min.]	Graphic Log	MATERIAL DESCRIPTION	WELL SCHEMATIC AND CONSTRUCTION DETAILS	FIELD NOTES
1780	510						
	515						
1770	520				CLAY (SC): pale brown (10YR,6/3), medium and coarse sand grayish brown (2.5Y,5/2), coarse sand light brownish grey (2.5Y,6/2), fine sand		
					Clayey SAND (SC): pale yellow (2.5Y,7/4), 40% medium sand, 20% fine sand		
	525				SAND and CLAY (SC): very pale brown (10YR,7/4), medium to fine sand, trace silt	Copper-bearing steel with 0.050" perforated horizontal louver shutter screen(390-540ft)	
1760					CLAY (CH): yellowish brown (10YR,5/6), fine to medium sand, trace silt brownish yellow (10YR,6/8), 15% fine sand, 15% medium sand		
	530						
	535				Clayey SAND(SC): light yellowish brown (2.5Y,6/4), 75% fine sand, 5% medium to coarse sand brownish yellow (10YR,6/8), 60% fine sand		
1750					CLAY (CH): yellowish brown (10YR,5/8), 5% fine sand, 10-15% medium sand		
	540				yellowish brown (10YR,5/4), fine to medium sand		
					Sandy CLAY (SC): light yellowish brown (10YR,6/8), medium sand trace silt and gravel		
	545				very pale brown (10YR,7/4), 15% fine sand, 5% medium sand, 5% coarse sand, trace silt	8x16 Tacna sand	
1740					yellowish brown (10YR,5/6), 15% medium sand, 20% fine sand, 5% coarse sand yellowish brown (10YR,5/6), 25% fine sand, 15% medium sand, trace silt		
	550				CLAY (CL): pale yellow (2.5Y,7/4), 5% medium sand, 5% fine sand light yellow brown (10YR,6/4), 10% fine sand, 10% medium sand, trace silt		

WILDERMUTH ENVIRONMENTAL INC.

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Client:	**BCVWD/STWMA**

Boring Log / H-1

Elevation, feet-msl	Depth, feet-bgs	Sample Interval	Drill Time [Rate, feet/min.]	Graphic Log	MATERIAL DESCRIPTION	WELL SCHEMATIC AND CONSTRUCTION DETAILS	FIELD NOTES
	555				Clayey SAND (SC): light yellowish brown (2.5Y,6/4), 30% fine sand, 20% medium sand, trace silt	8x16 Tacna sand	
1730					light olive brown (2.5Y,5/3), coarse sand, sub-rounded gravel, feldspar, granite, gravel pieces light yellow brown (10YR,6/4), medium to coarse sand	end cap	
	560				brown (10YR,5/3), fine to medium sand		
					Clayey Gravelly SAND (CGS): very pale brown (10YR,8/3), sub-angular gravel, medium to coarse sand		
	565				Sand with CLAY (SC): light olive brown (2.5Y,5/4), fine to medium sand, 10% coarse sand, trace silt		
					pale yellow (2.5Y,7/4), 25% fine sand, 25% medium sand, trace silt		
1720					light yellowish brown (2.5Y,7/4), sub-angular to sub-rounded gravel, fine coarse sand		
	570				brownish yellow (10YR,6/6), 40% fine sand		
					very pale brown (10YR,7/3), very pale brown 20% medium to coarse sand, 20% fine sand, trace gravel		
	575				SAND (SW): light yellowish brown (10YR,6/4), 70% fine sand, 10% medium to coarse sand, sub-rounded gravel		
					yellowish brown (10YR,5/6), 60% fine sand, 30% medium sand, angular gravel		
1710							
	580				CLAY (CH): light yellowish brown (10YR,6/4), fine to medium sand		
					Clayey SAND (SC): light olive brown (2.5Y,5/6), 40% medium sand, 20% fine sand, trace gravel		
	585				CLAY (CH): light olive brown (2.5Y,5/6), 15% fine sand, 5% medium sand		
					light olive brown (2.5Y,5/6), light olive brown 10% fine sand, 5% coarse sand, 5% medium sand		
1700					Sandy CLAY (SC): yellowish brown (10YR,5/4), 30% fine sand, 10% medium to coarse sand		
	590				yellowish brown (10YR,5/6), fine sand		
					CLAY(CL): pale yellow (2.5Y,7/3), fine sand		
	595				yellowish brown (10YR,6/6), fine to medium sand		
					yellowish brown (10YR,5/4), fine sand		
1690					Sandy Silty CLAY (SMC): olive brown (2.5Y,4/4), some silt, fine sand		
	600						

WILDERMUTH ENVIRONMENTAL INC.

Report WELL LOG; File: HEARTLAND WELL 1.GPJ, 11/29/2006

Project Name:	**STWMA PC-1**
Project Location:	**Beaumont, California**
Project Number:	**050-003-001**
Client:	**BCVWD/STWMA**

Boring Log / H-1

Elevation, feet-msl	Depth, feet-bgs	Sample Interval	Drill Time [Rate, feet/min.]	Graphic Log	MATERIAL DESCRIPTION	WELL SCHEMATIC AND CONSTRUCTION DETAILS	FIELD NOTES
	600				Sandy CLAY (SC): light to olive brown (2.5Y,5/6), medium to coarse sand, some silt		
					Sandy Silty CLAY (SMC): olive (5Y,5/4), medium coarse sand		
	605						
					CLAY (CH): light olive brown (2.5Y,5/4), fine to medium sand, some silt		
1680					yellowish brown (10YR,5/6), medium coarse sand		
	610				light yellowish brown (2.5Y,6/3), medium sand		
					yellowish brown (10YR,5/8), fine to medium sand		
					Sandy CLAY (SC): brownish yellow (10YR,6/6), fine sand, trace gravel & silt		
	615				dark yellowish brown (10YR,4/4), 20% medium sand, 15% fine to coarse sand, some silt		
1670					SAND (SW): olive brown (2.5Y,4/3), 20% fine sand, 40% medium sand, 30% coarse sand, some silt and gravel		
	620				Clayey SAND (SC): light olive grey (5Y,6/2), 40% medium to fine sand, 30% coarse sand		
					light yellowish brown (2.5Y,6/4), fine sand, trace coarse sand, some silt		
					Silty Sandy CLAY (MSC): light olive brown (2.5Y,5/4), medium sand		
	625				Silty SAND (MS): yellowish brown (10YR,6/4), 30-50% fine to medium sand, trace gravel		
1660					Clayey Silty SAND (CMS): olive (5Y,5/4), 30% fine to medium sand, 15-30% coarse sand		
	630				Sandy Silty CLAY (SMC): light olive brown (2.5Y,5/4), fine to coarse sand		
					Silty Sandy CLAY (MSC): light olive brown (2.5Y,5/4), fine to medium sand		
	635				olive brown (2.5Y,4/3), fine sand		
					olive brown (2.5Y,4/4), fine to medium sand		
1650							
	640						
					SAND (SP): light yellow brown (2.5Y,6/4), fine sand, silt		
					Silty SAND (MS): olive yellow (2.5Y,6/6), fine to medium sand		
	645				light yellowish brown (2.5Y,6/3), fine to medium sand		

WILDERMUTH ENVIRONMENTAL INC

Report WELL LOG, File: HEARTLAND WELL 1.GPJ; 11/29/2006

Project Name:	**STWMA PC-1**
Project Location:	**Beaumont, California**
Project Number:	**050-003-001**
Client:	**BCVWD/STWMA**

Boring Log / H-1

Elevation, feet-msl	Depth, feet-bgs	Sample Interval	Drill Time [Rate, feet/min.]	Graphic Log	MATERIAL DESCRIPTION	WELL SCHEMATIC AND CONSTRUCTION DETAILS	FIELD NOTES
1640					Clayey SILT (ML): light olive brown (2.5Y,5/6), fine to medium sand		
	650				Clayey SILT (ML): light olive brown (2.5Y,5/6), fine sand		
					Sandy CLAY (SC): olive yellow (2.5Y,6/6), fine to medium sand		
					Silty CLAY (MC): yellow (10YR,7/6), fine sand		
	655				CLAY (CL): light yellowish brown (10YR,6/4), fine to medium sand		
1630							
	660				SAND (SP): olive (5Y,4/3), 50% fine sand, 10% medium sand		
					Silty SAND (ML/SW): olive grey (5Y,5/2), 50% fine sand, 10-15% medium sand		
	665						
1620					Silty Sandy CLAY(MSC): light olive brown (2.5Y,5/3), 25% medium sand, 25% light yellowish brown (2.5Y,6/4)		
	670				Sandy CLAY (SC): light yellowish brown (2.5Y,6/3)		
					light yellowish brown (2.5Y,6/4), fine sand		
					olive brown (2.5Y,4/3), fine to medium sand		
	675						
1610					CLAY (CH): light olive brown (2.5Y,5/4), fine to medium sand		
					olive (5Y,5/6), fine to medium sand, sub-rounded		
	680						
	685						
1600							
	690						

Report: WELL LOG; File: HEARTLAND WELL 1.GPJ; 11/29/2006

WILDERMUTH ENVIRONMENTAL INC

Project Name:	**STWMA PC-1**
Project Location:	**Beaumont, California**
Project Number:	***050-003-001***
Client:	**BCVWD/STWMA**

Boring Log / H-1

Elevation, feet-msl	Depth, feet-bgs	Sample Interval	Drill Time (Rate, feet/min.)	Graphic Log	MATERIAL DESCRIPTION	WELL SCHEMATIC AND CONSTRUCTION DETAILS	FIELD NOTES
1590	695				CLAY (CH): olive (5Y,5/6)		
	700						
	705						
1580	710				olive (5Y,4/3), some well rounded sand		
	715				SAND (SW): some well graded sand		
1570	720						
	725				SAND (SW): pale olive (5Y,6/3), sub-rounded sand with trace gravel		
1560	730						
	735				CLAY (CH): fat clay with sand		
1550	740						

WILDERMUTH ENVIRONMENTAL INC

Project Name:	**STWMA PC-1**
Project Location:	**Beaumont, California**
Project Number:	**050-003-001**
Client:	**BCVWD/STWMA**

Boring Log / H-1

Elevation, feet-msl	Depth, feet-bgs	Sample Interval	Drill Time [Rate, feet/min.]	Graphic Log	MATERIAL DESCRIPTION	WELL SCHEMATIC AND CONSTRUCTION DETAILS	FIELD NOTES
					SAND (SW): well graded sand, trace silt		
	745				CLAY with SAND(SC): light olive brown (2.5Y,5/4)		
-1540							
	750						
	755						
-1530							
	760						
	765						
-1520							
	770				SAND (SW): yellowish brownish grey (2.5Y,6/2), well graded sand		
					CLAY with SAND (SC): light olive brown (2.5Y,5/4)		
	775				SAND with CLAY (SC): light olive brown (2.5Y,5/3)		
-1510							
	780				CLAY (CH): light olive brown (2.5Y,5/6), fine to medium sand		
	785						

WILDERMUTH ENVIRONMENTAL INC.

Report WELL LOG; File: HEARTLAND WELL 1.GPJ; 11/29/2006

Project Name:	**STWMA PC-1**
Project Location:	**Beaumont, California**
Project Number:	**050-003-001**
Client:	**BCVWD/STWMA**

Boring Log / H-1

Elevation, feet-msl	Depth, feet-bgs	Sample Interval	Drill Time [Rate, feet/min.]	Graphic Log	MATERIAL DESCRIPTION	WELL SCHEMATIC AND CONSTRUCTION DETAILS	FIELD NOTES
1500	790				SILT (ML): light yellowish brown (2.5Y,6/3) CLAY (CH): olive brown (2.5Y,4/4), fine to medium sand		
1490	800						
1480	810				CLAY (CH): brown (7.5YR,5/4), some fine sand		
1470	820				SAND (SW): light olive brown (2.5Y,5/4), fine to coarse sand, sub-rounded		
1460	830						

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Report WELL LOG; File HEARTLAND WELL 1.GPJ; 11/29/2006

Appendix C

Map of the STMZ

Appendix D

Well Site Investigation Photographs

Road side site in the upper canyon

Site on City of Beaumont property adjacent to Palmer/San Timoteo Canyon Road. Site is adjacent to fire hydrants and storm drains and has sufficient working area.

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Author: MC

Date: 20111020

File: Appendix_well_site_1.mxd

Potential Well Site Alternatives (Upper Canyon)

San Timoteo Management Zone

Appendix D

Site on turnout adjacent to road. Restricted area means that it may be necessary to occupy part of the field adjacent during construction

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Lake Forest, CA 92630

Date: 20081030

Potential Well Site Alternatives (Upper Canyon)

San Timoteo Management Zone

Appendix D